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ABSTRACT

Abstracts of 12 seminar discussions held between October, 1967 and March, 1968 are reported in this first volume in a series of reports which give the results of a year-long study of the conditions, requirements, and variables affecting the quality of complex learning mediated by instructional television systems. Discussions in the seminars reflect two broad areas. First, the factors, contingencies, and conditions which affect the quality or effectiveness of instructional media programs are described. Second, an examination is provided of instructional television and radio and their interrelationship to each other and to instructional materials such as videotapes, films, discs, computers, and other materials and devices. (EM 007 927, EM 007 928, and EM 007 929 are related documents.) (Author/SP)

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ABSTRACTS OF SEMINAR DISCUSSIONS
ON
QUALITY FACTORS
IN
INSTRUCTIONAL MATERIALS

M 007 926

ED037099

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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ABSTRACTS OF SEMINAR DISCUSSIONS ON QUALITY FACTORS IN INSTRUCTIONAL MATERIALS

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SEMINARS

INDIANA UNIVERSITY	October 6 and 7, 1967
UNIVERSITY OF NOTRE DAME-PURDUE UNIVERSITY	October 25, 26 and 27, 1967
UNIVERSITY OF ILLINOIS	November 3, 1967
THE PENNSYLVANIA STATE UNIVERSITY I	November 20, 1967
THE PENNSYLVANIA STATE UNIVERSITY II	December 11, 1967
WASHINGTON, D.C. - Joint Sponsorship with the National Association of Educational Broadcasters	December 18 and 19, 1967
THE PENNSYLVANIA STATE UNIVERSITY III	January 8, 1968
ATLANTA, GEORGIA - Joint Sponsorship with the Southern Regional Education Board	February 8 and 9, 1968
THE PENNSYLVANIA STATE UNIVERSITY IV	February 12, 1968
BOCA RATON, FLORIDA - Joint Sponsorship with Florida Atlantic University	February 22 and 23, 1968
UNIVERSITY OF GEORGIA - Sponsored by the Georgia Center for Continuing Education	March 18, 1968
QUAIL ROOST CONFERENCE CENTER - Joint Sponsorship with the Regional Educational Laboratory of the Carolinas and Virginia	March 21 and 22, 1968

PREFACE

General Report Number I, Abstracts of Seminar Discussions on Quality Factors in Instructional Materials initiates a series of general, special, and varied reports which give the results of a year-long study of Conditions, Requirements, and Variables Affecting the Quality of Complex Learning Mediated by Instructional Television Systems.

The purpose of the study is to describe factors, contingencies, and conditions which affect the quality or effectiveness of instructional media programs.

Quality is defined as the extent to which instructional units and programs produce defined changes in the behavior and experiences of individual learners of target populations. Quality is synonymous with the concepts of instructional effectiveness. Accordingly, the abstracts of seminar discussions which constitute this Report cover a very wide range of conditions and contingencies which are judged by participants to increase, to decrease, or to have no effect on instructional quality of programs.

The Penn State study of quality was invited by the Bureau of Research, U. S. Office of Education, expressly to provide useful information for the Commission on Instructional Technology. The Commission is charged by the Congress "...to conduct...a comprehensive study of instructional television and radio...and their relationship to each other and to instructional material such as videotapes, films, discs, computers, and other materials and devices..." (Public Law 90-129, November 7, 1967), and to report to the President of the United States before June 30, 1969.

Therefore, the Penn State study of instructional quality in television ("IQ-TV") has been broadened not only to include a wide range of kinds of media and modes of communications but also to include a wide range of conditions and contingencies which may affect the quality of those instructional materials. These two broad dimensions are reflected throughout this Report.

The assumptions on which the seminar plan was based are the following:

1. That small groups of mature, informed, and experienced educators, who are familiar both with media and the requirements and conditions for learning, can formulate sound and useful judgments about the patterns of conditions and contingencies which affect the quality of instructional programs.
2. That conditions can be arranged in sustained small-group discussions

for productive, creative, imaginative, and yet valid judgments on how to produce, distribute, and use high-quality instructional programs. 3. That small groups of professional educators who focus their attention on the problems of using a wide spectrum of media in education can perceive unsolved problems and needs and subsequently formulate important suggestions and recommendations for the Commission on Instructional Technology.

The procedures for organizing and conducting the seminars will be described in a later general report. The written abstracts of this Report were made from 117 hours of sound recordings and notes from 12 extended seminars involving almost 100 discussants. These records confirm and qualify the validity of the basic assumptions of the seminar processes although their actual usefulness for the Commission remains to be determined.

Clearly a great debt is owed to many people and many institutions for their cooperation and assistance. Lists of these are given at the beginning of each section of this Report. Sound tapes were abstracted by Ruth J. Carpenter, Donna Conway, Richard Meade, John L. Reilly and Susan Smith Reilly. Ruth J. Carpenter coordinated the planning of seminars, monitored them and edited the several drafts of abstracts as well as this Report. Grateful acknowledgments are made for all the assistance and help given by these involved people.

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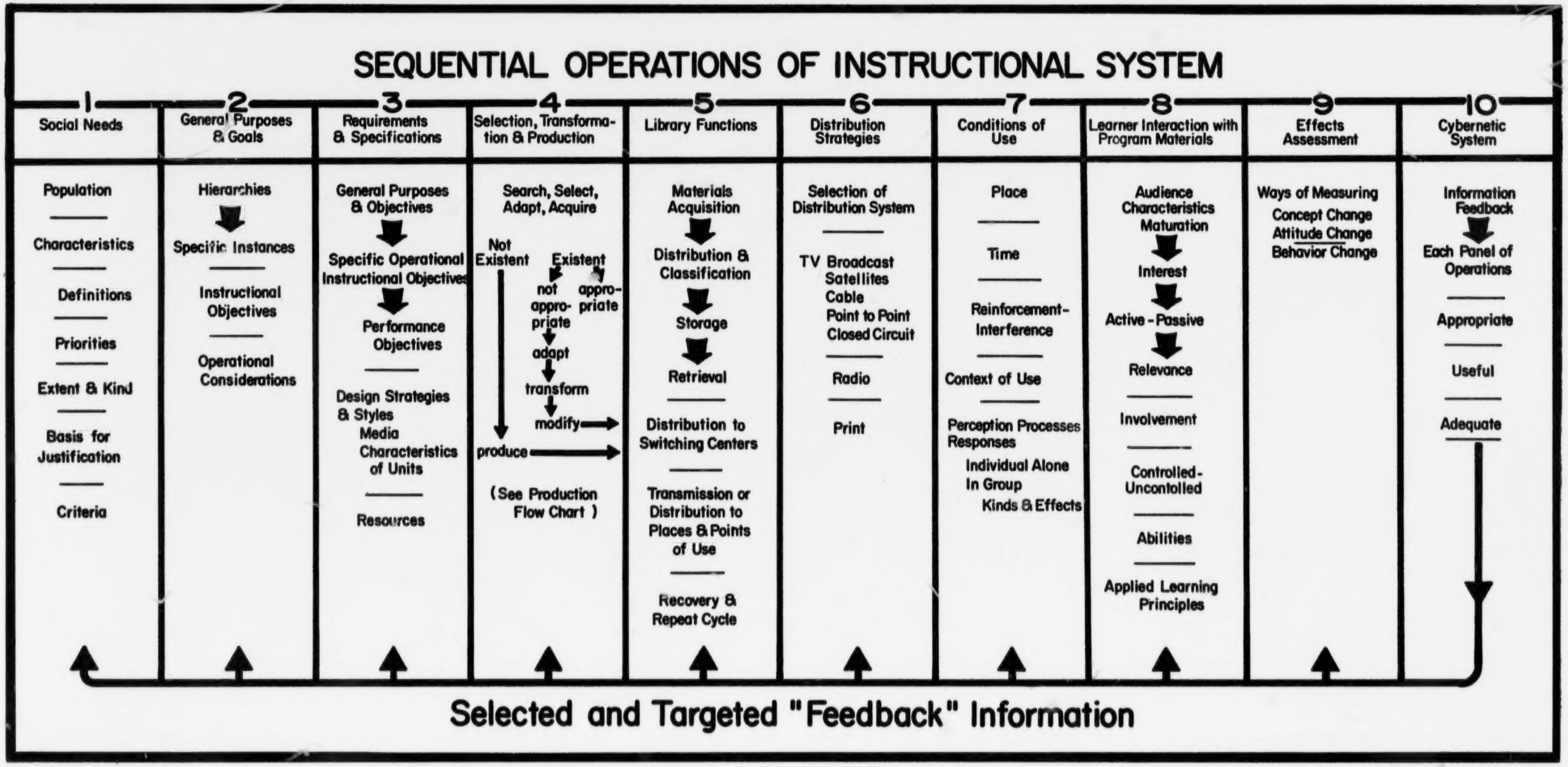
SEQUENTIAL OPERATIONS OF INSTRUCTIONAL SYSTEM

1
Social Needs
Population
Characteristics
Definitions
Priorities
Extent & Kind
Basis for Justification
Criteria
2
General Purposes & Goals
Hierarchies
Specific Instances
Instructional Objectives
Operational Considerations
3
Requirements & Specifications
General Purposes & Objectives
Specific Operational Instructional Objectives
Performance Objectives
Design Strategies & Styles
Media Characteristics of Units
Resources
4
Selection, Transformation & Production
Search, Select, Adapt, Acquire
Not Existent
Existent
not appropriate
appropriate
adapt
transform
modify
produce
(See Production Flow Chart)
5
Library Functions
Materials Acquisition
Distribution & Classification
Storage
Retrieval
Distribution to Switching Centers
Transmission or Distribution to Places & Points of Use
Recovery & Repeat Cycle
6
Distribution Strategies
Selection of Distribution System
TV Broadcast
Satellites
Cable
Point to Point
Closed Circuit
Radio
Print
7
Conditions of Use
Place
Time
Reinforcement-Interference
Context of Use
Perception Processes
Responses
Individual Alone
In Group
Kinds & Effects
8
Learner Interaction with Program Materials
Audience Characteristics
Maturation
Interest
Active - Passive
Relevance
Involvement
Controlled-Uncontolled
Abilities
Applied Learning Principles
9
Effects Assessment
Ways of Measuring
Concept Change
Attitude Change
Behavior Change
10
Cybernetic System
Information Feedback
Each Panel of Operations
Appropriate
Useful
Adequate
Selected and Targeted "Feedback" Information

ABSTRACT

INDIANA UNIVERSITY

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

October 6 and 7, 1967

ABSTRACT

INDIANA UNIVERSITY
SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
October 6 and 7, 1967

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DISCUSSION TOPICS: Page

SOCIAL NEEDS

National Goals 1

GENERAL PURPOSES AND GOALS

Instructional Objectives 1
Role of the Media 1
Television 1

REQUIREMENTS AND SPECIFICATIONS

Design Strategies 2
Quality 3
Acceptance of Media 3
"Slippages" or Barriers to Acceptance 3

SELECTION, TRANSFORMATION, AND PRODUCTION

Extant Materials 5
Sources 5
Principles of Selection 5
Transformation 6
Production 6
Production Centers 6

EFFECTS ASSESSMENT

Ways of Measuring 7
Pretesting in Production Stage 7

SOCIAL NEEDS

National Goals

National goals in all areas must be determined and then those which relate to education must be identified. Any educational program must be in harmony with national motivations and national interest.

Social change, rather than industrial change, should be a major part of evaluation.

Principles need to be taught with local applications and this can be done in many ways.

GENERAL PURPOSES AND GOALS

Instructional Objectives

The basic approach of the systems designer should be to define the instructional objectives, then to look at examples of the best programs. This approach makes it possible for him to see what is represented and to assess each program's merits relative to objectives and high standards. The designer needs to know a lot about many components, those which work differently in isolation than in constellations. It is more than the problem of asking the right questions about the objectives; it is also the problem of examining the basic assumptions behind the objectives. Too often there are whole sets of assumptions held to be inviolate and therefore never questioned. In this way we perpetuate practices which were questionable from the beginning.

Role of the Media

Television

The role of television has two parts, general and specialized. In one case where a survey of elementary school instructional needs was made, the designers looked at all the schools in the area where television was being used for reinforcement of the greatest teacher weaknesses and insecurities; music, art and science. The role of television was defined to be that of an electronic specialist teacher. The designing group viewed some 70 or 80 programs in elementary school art. These programs were supposed to be the best examples of art teaching. The next step was to bring in art experts and ask them to make a general assessment of the programs. What happened was that the medium of television became the vehicle for looking at the state of the art. The programs, even the best examples, were focused on teaching the children to be artists. This single model approach was never questioned. Television became a way of discovering exactly how art was being taught, which was the single concept method of turning the camera on the teacher, in other words, "the megaphone effect." Awareness is the initial step in improvement of education, and the new art courses took the multimodel approach to art education. This approach combined the creative aspects of art of the single model approach with a broad study of understanding art for the purpose of providing the background for the students to become appreciative of art and discriminating critics in later years when they become consumers of art, and with supportive information in the history of art. In this case, the result of this probe into the assumptions behind the television teaching of art created guidelines for better identifying and assessing the basic approach.

One of the most important roles for television is making visible the involvement of people and the educational processes.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

The restraints to acceptance of instructional television are sometimes system restraints, not people restraints. State educational budgets are organized by traditions, and there is no place in the system to bring in innovation. An administrative structure as it exists in most states cannot successfully manage a state-wide telecommunication enterprise. The system as a whole must be changed if innovation is to be encouraged and developed. However, any change of significance in a major component of a system changes the whole system.

Very different strategies are required at different levels of the educational system; elementary, secondary, higher and adult education.

Taking the problem of the broad scope of a project, there should be general and specific guidelines. Here is one example where the power structure needs to be convinced of the need for better planning in the design phase. In the development of a project, the first need is to set forth criteria of the measurable objectives and use these as specifications for the instructional program. These objectives then should be validated. In making a critique of the specifications, these should be some of the considerations: 1. The scope, number and range of students reached. 2. The effect made on each individual. 3. The question of whether or not it is possible to do what is attempted. In measuring objectives, there must be two viewpoints: the scientific one which can be proved and the opinion one which relies on individual judgment.

Quality

Quality shall be considered as those factors producing behavioral changes intended in the target population. Quality can be defined on a general level, reaching people and creating understanding of human variability. Quality may have quantity dimensions.

In defining objectives for developing instructional materials, two elements of quality should be (1) how well does the material do what was proposed to do, and (2) has it attempted to do what should be done? In appraisal of success, tests should cover the scope of quality aspects of education.

There is a need to have criteria for the measurable objectives or specifications for instructional programs. These criteria should consist of a critique of the specifications.

Quality is a judgment. The problem is to collect and use good evidence as a basis of the judgments about quality.

In dealing with quality, all phases of the educational system should be looked at. The consideration should not be limited to upgrading stimulus material.

The quality of the message (content) material focuses on the learner, the educational aspects; the transportation of the message brings in engineering and economic problems. The quality question must have these two parts; the message cannot be constructed until there is a delivery system.

Acceptance of Media

"Slippages" or Barriers to Acceptance

Because one of the roles of television is to function as a change agent, there are many fundamental problems which affect quality working against acceptance of television in the classroom.

1. Faculty resistance. Pre-recorded materials may cause fear in teachers of not being able to comment on information they do not understand. There is still some vestige of the irrational fear of teachers that television will cause their displacement. Along with these barriers

the teacher view of television as an interference between the teacher and the students exists in many schools. In Chicago, the AFL-CIO Teachers Union has written into the contract a clause to the effect that there would be no such interference, and this wording refers specifically to television. In dealing with this type of resistance, real teacher fears must be considered. One way to do this is for television to move away from imitating the lecture system and begin to do what the teachers can't do.

2. Resources and requirements. The greatest slippages occur wherever the mismatch is between the resources which are available and the requirements of the task set forth in the specifications. Designers must do a more realistic job of analyzing the true resources.

3. Time availability. Slippages occur many times because the curriculum is completely filled. Sometimes it is purely and simply a matter of the television scheduling at a time when the class cannot arrange to see the program or a matter of no time slot available to add a television program.

4. Conflict between the user and the learning model, conceived in isolation.

5. Oversimplified conceptualizations of the educational process. The complicated problem of understanding how a student learns cannot be solved by oversimplified solutions.

6. Mistaken conceptions of roles. The roles and interaction between teacher and the television teacher must be delineated. Some professors believe that television retards the development of classroom teachers. There must be a change in roles.

7. Poor performance in areas where training could correct the deficiencies. The standard method of teaching teachers (plan, prepare, test, modify) allows the teacher to learn much about herself. She also observes the relationship of the media and the students in the teaching process so that the result can cause behavioral change of the students. Each teacher can vary the use of the available materials and match them to her individual style of teaching.

8. Inadequate familiarity of trainees with media. Media courses as they are taught are not satisfactory. If courses could deal with

requirements, then they might be worthwhile. However, there will not necessarily be better utilization by requiring courses in media.

SELECTION, TRANSFORMATION, AND PRODUCTION

Extant Materials

Sources

The possible sources of instructional materials, those produced nationally, regionally, and locally, meet different needs. About 40 percent of material used is not produced locally. However, what is produced nationally will always be only a part of the total teaching-learning system.

There is no longer any "local" prejudice against remotely produced instructional materials. Rejection of nationally produced materials is not made on the basis of geographical or regional considerations; rejection is based on the use situation.

There will always be a need to produce custom materials for local adaptations and unique situations. However, basic productions, that is, productions which have a common denominator for all instructional systems at one level, are also required and feasible.

Principles of Selection

"Stock footage," that is, material already in existence, can be selected for classroom use, but there is still the need to define the audience and outline the objectives. The availability of extant materials varies in different content areas. Information banks could be set up along the lines of the one at Purdue which provides descriptions of all metals.

One of the first considerations in meeting the needs for instructional materials should be the rule of thumb that it is not possible to produce all the materials used in the classrooms for elementary, secondary and higher education and that selection must be considered at the outset; production should be entered into only when the required materials do not exist.

The central production unit would be the logical group to undertake the search, evaluation and retrieval for extant materials along with the production of new materials.

In selecting materials from national, state, local and class sources, there are two conflicting principles for selection at work:

SELECTION, TRANSFORMATION, AND PRODUCTION

PRINCIPLE: Starting with the classroom as a source, never go any higher than necessary in order to have the greatest diversity of options.

PRINCIPLE: Starting with national production sources, make your selections at the highest possible level.

Transformation

It is often expeditious to change the commentary but use the visual material of a film. This obviously is economical.

Production

Production Centers

Where should instructional materials be produced? Could a network of national production centers be set up? If so, what are some of the problems which would have to be worked out? Is it really possible to design an instrumentality?

Production centers should be university based. There must be some way of making them free of inappropriate patterns of power, from competing goals and objectives and from entrapment. These centers could be a kind of RAND Corporation.

Design Characteristics

In establishing the design characteristics of a network of production centers for instructional materials, the fundamental blueprinting is the critical problem. Blueprinting refers to the method of design and planning, that is, the cognitive operation, so that a clear course is outlined for the development of the activities carried on in the centers. Dissonance occurs when there is a lack of clear blueprints. Blueprinting is the important problem and the actual producing of the instructional materials becomes a technical one.

The design characteristics must be responsive to the demands of the market place.

Staffing for Centers

People with special training will be needed to staff instructional materials production centers. Once the system has been designed and blueprinted, people who can work within this framework will have to be trained.

The staff will work as a team, with each team member training interns and trainees in their fields and continually recruiting qualified persons. The team would include subject matter authorities, media designers, learning theory experts, learning evaluators, methodologists and curriculum specialists.

There must be organic continuity of people and operations. The team system would give all members a common language.

Financing of Centers

Private industry cannot afford to establish, staff and maintain instructional materials production centers. Whereas the cost of speculation is not great with publishing, with electronic materials the costs are very high.

It could be possible for the federal government to support the planning and design phase, then let the blueprint out for bids.

A business management arrangement, similar to the RAND idea, could be worked out so that an entirely new kind of organization resulted.

Research by the Centers

End product materials are frighteningly indifferent to the R & D approach. It is a sad fact that millions of dollars have been wasted in R & D by using the wrong approaches. What is needed is programatic research and development instead of isolated projects. There also must be a test of productivity, a feedback of yields that actually show up. Most of the researchers in the present R & D centers continue to do what they were already doing. The thrust should be toward a combination of normative and innovative research.

Creating a "think tank" which would be open to professors who wish to work on an idea that promises to be valuable is not enough. The centers should be much broader in their operations; they should provide qualified staff and facilities for production, writing, field testing, evaluation and dissemination to support the research.

EFFECTS ASSESSMENT

Ways of Measuring

Pretesting in Production Stage

After the design of the program has been thought through and blueprinted, that is, the formulation of suitable objectives, defining and redefining these objectives and studying their appropriateness to the learner, a prototype unit or units should be produced.

EFFECTS ASSESSMENT

From these prototype units, a presentational format can be found.

In working toward perfecting this format, each lesson should be tried out on closed circuit, then revised before presentation on open circuit.

Some form of classroom evaluation should be developed. There are three parts to this basis for assessment of the merits of the program: the reactions of the students expressed in writing, the reactions of the classroom teachers in the form of questionnaires and subjective comments, and the anecdotal statements of the supervisors who act as observers.

ABSTRACT

UNIVERSITY OF NOTRE DAME-PURDUE UNIVERSITY

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

October 25, 26 and 27, 1967

ABSTRACT

UNIVERSITY OF NOTRE DAME-PURDUE UNIVERSITY
SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
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DISCUSSION TOPICS: Page

SOCIAL NEEDS

- Priorities 1
- Criteria 1
- Extent and Kind 1

GENERAL PURPOSES AND GOALS

- Instructional Objectives 2
  - Secondary School Science Curriculum 3
- Role of the Media 4
  - Television 4
  - Programed Courses of Study in High School Science . 6
  - Teaching 6
- Federal Programs 6
  - Planning 6
  - Production 7
  - Proposals 8

REQUIREMENTS AND SPECIFICATIONS

- Design Strategies 8
  - General 8
  - Uses of Multimedia 9
  - Examples 11
- Economics of Education 11
  - Resources 11
- Specific Operational Instructional Objectives 12

SELECTION, TRANSFORMATION AND PRODUCTION

- Selection 12
  - Search 12
- Production 13

DISCUSSION TOPICS: (cont'd) NOTRE DAME-PURDUE **Page**

LIBRARY FUNCTIONS

Student Access to Library 13
Learning Resources Center 13
  Indoctrination 13
  Production 14
  Distribution 14

DISTRIBUTION STRATEGIES

System 14
  Indiana Telecommunications Network Case Study . . . 14

CONDITIONS OF USE

Dormitory Rooms 17
Examples 17
Audio Tutorial Laboratory 18

EFFECTS ASSESSMENT

Ways of Measuring 18
  Examinations 19
  Case studies 19
Behavior Change 20

SOCIAL NEEDS

Priorities

In the development of the Indiana Telecommunications Network, the needs of the State and the areas of instruction in which the greatest statewide concerns existed were studied and singled out for special emphasis. These areas were identified as follows: graduate engineering courses, teacher education, medical and veterinary education, and agriculture extension. Other directions to be included as possibilities for later extension of the network were vocational education training and in-school instruction for the county school systems.

Criteria

Education must make demands on the state of the art technologically. The two parts of the process of instruction by technology must be considered: which comes first; the "gadget," or the educational problem? Do we first look to industry to develop the device and then scout around to see how education can put it into use, or do we examine the needs of the educational process and look to industry to help work out ways of meeting these needs? The time has come for education to take the lead and demand that industry work toward finding solutions to problems defined by education.

Extent and Kind

Basically, the goals of the university should be the goals of the society in which it functions, the creation of a literate population. Thus the real goal is to take in, ingest, reorganize, reshape and reform individuals so that they can function properly in the society which they will join. In order to fulfill this function these individuals have to be literate at a certain level in order to perform at the level required by today's society as biologists, math teachers, or in whatever specialty for which their education has trained them. This is the transfer of the common good to the individual good, and, in reverse this is the thesis that the aggregate of individual good adds up to the greatest common good.

Within the university structure, another set of goals is at work. These are the goals of the professional societies, which can be and often are antithetical to the goals of the university. There are horizontal and vertical goals. Each institution defines its set of goals, but the professors in each institution have to take into consideration an

SOCIAL NEEDS

additional set of goals established by their discipline. Often, for instance, chemists teaching in widely separated parts of the country talk to each other more regularly than do chemists and English professors teaching on the same campus.

The university goals have two main directions: teaching and research. (These are activities, not goals.)[*] The use of technology to advance these goals in both directions is a goal in itself.

The university in its proper role should be a change agent. It takes in people, effects a change, then puts them back. The success of the university revolves on the answer to the question: "Has it made any change in the goals of society at large?"

One of the priority goals for the nation should be that every individual be provided with the opportunity to become educated to his fullest capacity if he has the desire for that education. This goal can never be reached by modifying and extending the present condition of American education. Education in this country needs more serious study; as a nation we can and must afford the financial demands which a more effective educational system will ask of us.

GENERAL PURPOSES AND GOALS

Instructional Objectives

There are many goals about which an institution should be concerned in its instructional program.

1. Information transfer. Perhaps this term should more correctly be phrased -- proficiency development.
2. Motivation of students.
3. Counseling of students.
4. Peer group reinforcement. Here the university should attempt to offer the students a total learning opportunity and to meet the requirements for total environmental learning, not just the presentation of formal instruction.
5. Continuing Education.
6. Research in educational methods for the sake of research.
7. Return benefit to the institution. It should be important to the university that its "products" perform in their chosen fields after they

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[*] CRC note.

have left the university and that their achievements bring distinction to their alma maters.

8. Placement. The university should serve a placement function for its graduates. It should have an interest in seeing its students not only established in their disciplines but moving ahead. It should be concerned with the welfare of its "product" after it leaves the premises.

Secondary School Science Curriculum

There is concern in the professional scientific societies and by those in the scientific disciplines that each year the percentage of the high school student winners of National Merit Scholarships who go into the sciences has declined. The fields mostly affected are physics, chemistry and engineering; biology seems to continue to attract the top high school students of the country.

To get at the root of this trend, the high school science curriculum must be examined. The underlying reasons would point to the influence of high school science teachers. What can be done to motivate good students to go into the sciences? We have to be thinking in terms of working with those teachers who are highly motivated toward their career of teaching high school science but who have not had the kind of scientific background which is necessary to teach the present day curriculum.

The colleges of education must face up to this situation. The battle between content and method continues, but this is the incorrect emphasis. The real problem as far as the high school science program is concerned is that the colleges of education must develop courses which will produce science education people, not scientists. The teachers coming out of the colleges of education must have and be able to transmit a basic understanding of science. This must apply not only to high school science but all the way down into the elementary grades.

In California a system has been formulated which provides a service to all science teachers in that state through the Hall of Science. This is a continuing education program housed in a science center. Any teacher can come to this center and develop the kind of materials he or she needs. They can put together demonstration kits, laboratory kits, and work out better ways of supporting their teaching.

GENERAL PURPOSES AND GOALS

In the field of chemistry, there are very few materials which are at all suitable. Certainly there are very few good materials. Teachers who would like to do so are very reluctant to use the available materials and are concerned over the lack of good teaching aids. A committee within the American Chemical Society tried to stimulate teachers' individual efforts to create teaching materials by starting a small grants program. The procedure is to invite proposals from chemistry teachers at all levels of secondary and higher education. These proposals are short, two or three pages, giving a brief outline of the kind of material to be developed, such as film loops, CAI, computer graded essay tests, or demonstration kits. The grant goes directly to the teacher. The committee tries to make these grants, each of which is limited to a few hundred dollars, to persons who will develop the kind of material which has general application and can be used by more than the one teacher. The next step is to encourage the commercial producers to develop these materials.

In the field of physics, Purdue spent $70,000 on a project to film demonstrations. The films are well produced with all the virtues: they are clean, effective, and absolutely authentic. Each one deals with a single concept and they range in length from six or seven to fifteen minutes. However, these films are not used. Whatever the reasons are, they are not connected with the quality of the materials themselves.

Role of the Media

Television

How to implement the goals of information transfer (or proficiency development) entails reinterpretation of instructional television to mean educational technology in its broadest terms. All of the 500 or so studies on the comparative effectiveness of television instruction and traditional teaching by the lecture method have shown no significant differences. Perhaps these findings are due to the fact that the criteria used have been too gross and the studies have been evaluated too broadly. It is clear that in any instructional method summarizing salient facts is not enough. The book has failed to be flexible enough, it largely ignores visual means to learning. Today's students are oriented in different ways, they have been brought up to look at pictures and listen to broadcasts. Education should take advantage of the built-in orientation to media in today's student population.

GENERAL PURPOSES AND GOALS

Television is particularly well adapted to presenting live demonstrations. In producing this kind of a demonstration, the "ham" quotient comes through and makes for an improved production. If the professor can present the information and do it in the way that communicates to the students that he is enjoying what he is doing, he can combine the goal of information transfer with that of motivation.

Even though the usual reply to the suggestion of using television for demonstrations by the instructors is basically, "Please, Mr. Audio-Visual Man, I'd rather do it myself," this is and will increasingly become a luxury no one can afford. Television is so often reduced to an entirely quantitative problem when it is actually a qualitative problem.

An institution in formulating its goals for the use of television as transfer agent should study what the impact of television is, what its potentials are, what should be left to other media, and what complexes of various media could be tried out.

Considering that the trend is away from classroom regimentation and regularization of laboratory demonstrations, can the same application be used for recitation classes, lectures, or home-study augmented programs?

What should television be absolutely best for, ahead of the other media?

1. It magnifies the material the laboratory instructor is using during a demonstration or experiment.

2. It shows kinds of material not possible to show otherwise.

3. It is flexible in that it can show what is going on at the same time it is being done and also retained for further use.

Devices can provide individual drill requirements. There seems to be a trend in beginning science courses to abandon drill and problems in the laboratory sections. So much of this drill and practice could very well be handled through technical means. For sixty minutes of time spent in a laboratory section to set up the equipment and do the "housekeeping" tasks to conduct a demonstration, the same instruction could be better transmitted in about ten minutes by a film or videotape.

GENERAL PURPOSES AND GOALS

Programed Courses of Study in High School Science

An area where special efforts have been directed toward improvement of science teaching in the high schools is that of programed courses. The leadership has come from the National Science Foundation and from the professional societies. Some of the resulting courses are PSCS, Chem Study, and BSCS. These programs were developed in and by universities with the advice of high school teachers. Here the experience has also been surprising. For instance, Chem Study was hailed as an outstanding example of programed instruction by the professional groups. It was considered to have excellent content and won the acclaim of professional opinion. In actual use, it has been disappointing. Part of the problem is that only about five percent of the high school chemistry teachers are capable of teaching the course; the majority simply cannot handle the material. In Florida the state department of education required that all schools use this course. Many teachers left the profession; most of those remaining are trying to teach a course they are not prepared to teach.

Teaching

Another problem of science teaching in the high school seriously affects the instructional goals. So many of those now teaching chemistry, in high schools for instance, are primarily physical education teachers who have been assigned the chemistry laboratory as an extra duty. Realizing that high school science teachers in general and chemistry teachers in particular needed upgrading in their teaching fields, the National Science Foundation and professional societies embarked on a planned summer institute program. The results were surprising. The updating was successful in bringing up the instructional ability of the teachers. Indeed, it was too successful. The improvement inspired the teachers to seek better teaching jobs in junior colleges and even in institutions of higher education. The experience of these professional societies seems to indicate that high school science teachers cannot be overeducated.

Federal Programs

Planning

The big question is -- How can use be guaranteed when the quality is deemed to be excellent?

GENERAL PURPOSES AND GOALS

What would be some of the ways, separately or in combinations, that federal money could be funneled into programs to support the development of high quality instructional materials? Three of the possibilities are these:

A grant program could go directly to individuals. There is always a high mortality rate for programs of this sort, but this would have to be taken into consideration at the beginning and counted on as a source of risk.

Production

A production approach could be worked out. This would put the money in the hands of a production group who could bring in the top people in whatever subject the materials were to cover. The production group would be "ad hoc" to the particular series for which the money was granted.

A massive central effort approach could also be worked out. This approach would have to consider the experiences of previously produced materials which have not been accepted and used. Massive productions so far have not been effective; in general, high hopes have not been borne out and use has not been high.

The best way to begin is to think in terms of different plans for different programs, not an either / or but a combination of approaches.

Here are some of the suggestions to consider at the outset:

Before the criteria are established, talk with the students in actual use situation, follow through the steps in any type of programed instruction and check what is being done against worthy criteria. Find out how the students react to the material.

Once a particular program of instruction has been chosen for development, invite the interested people to submit proposals. The group evaluating the proposals should have several subject matter specialists as readers in the particular field involved to make judgments about the usefulness of the material, production people to look over the facilities to be used, and evaluation specialists who can assess the degree to which the material reaches the stated goals. The group should be multi-media oriented and interdisciplinary. The proposals should state clearly the procedure to be followed in three areas: planning, production, and use.

GENERAL PURPOSES AND GOALS

Proposals

Planning. The planning should begin with the specification of learning goals for the material. The goals should be clearly thought out and accurately stated. In the course of producing and polishing, trials and field trials should be set up in order to establish evidence of what kind of effect the materials could be expected to produce.

Production. The material should not be organized and produced as a full course. It should deal with a single unit or segment of information. Full courses are not elastic enough.

Use. The same group who produced the material should be kept intact for the evaluation period. This group should understand fully the responsibility it has to produce an effective teaching instrument.

Distribution. When the materials have been produced and are ready for distribution into an instructional system, they would be accompanied by an assessment of the kinds of effect they have been found to have as measured by the testing program.

Assessment. In judging the quality of any body of material, the consideration must cover the demonstrated instructional impact. The quality has to be so high that the faculty or administrative decision makers and the teachers in control of the intended audience cannot ignore the material. It must be so high that they could not possibly do it themselves.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

General

In the design of courses in the sciences; biology, chemistry, in particular, the general courses for nonscience majors are now changing from macro to micro labs. The trend in this direction is away from skills and toward understanding theory.

The goals of courses, particularly in undergraduate education, serve the transfer of information function with strong efforts to build in motivational material. In this connection, it has been the experience of of experimenters in programed learning that the transfer of information can be presented effectively, but that no successful method of supplying motivation has been found. Originally it was though that, if the student proceeding through a course of programed material answered the questions correctly, the very state of being correct and being congratulated by the program would in itself motivate the student to continue. The present thinking is that there is no adequate rationale to defend this assumption.

An important influence in assessing goals of education is the matter of interesting the student in the information and of heightening his ability to recognize its worth and usefulness. Here is an area where very little attention has been focused. The real goal could be termed -- student awareness of the value of the information.

Granted that information transfer is of prime importance, in the case of electrical engineering for example, the secondary goals would be to create in the student a condition of thought, or a habit of thought, which would lead to solutions to technical problems of many and different types.

The decision to abandon drill and problems in the beginning science course was based on the accepted fact that these two functions could very well be handled through technical means. Students cannot really do chemistry problems; they take too long. In fact, the professor can't possibly talk about the real problems for the same reason. As a substitute, devices can be used for selective drill and can be adjusted to suit the individual differences of the learner.

One of the drawbacks is that as beginning chemistry stresses more theory and becomes more abstract, it also becomes less exciting. When you take the "fun" out of a chemistry lab, the students are not really having the experience of doing the experiment or performing the demonstration.

The movement is toward lecture/demonstrations with the use of the media. For such kinds of learning as phenomena observation, films or videotapes offer the best possible means of presenting the information and this can also be "fun" manipulated. The student can see on the screen that copper sulphate is not merely a chemical formula, he can see the blue crystals, how they dissolve in water, and he can behold the chemical. In large classes not using filmed material it would be impossible for every student to have the chance to see the properties of copper sulphate.

Uses of Multimedia

The instructor organizing the laboratory sets about taking the information and examining it in the light of how it can be best presented by various media, such as 8 mm cartridge, film, audiotape, microscope slides and actual specimens. The information is then divided up among these media. This very process of thinking out the best method of presenting the material and assigning the best fitted method for getting the information to the students in itself changes the teaching process. At some point, any given medium becomes capable of more than the assigned function, that is, to convey the originally assigned bit of information. The instructor who is putting this course together in the laboratory-learning situation finds that the sense of process he is going through begins to shape his reactions, he thinks of additions to the material, he thinks of new methods of explaining concepts, and he studies different devices to use. Now he has organized the laboratory course, with added information slipped in, and he has accomplished his original goal of information transfer, but has now set an expanded goal for the course. When you compare this expanded material presented by television with the standard course given by the lecture method, you aren't really presenting the same material. On television you are presenting from fifty to seventy-five percent more information. In fact, on the tube you are displaying considerably more information than the human receiver can pack into the extra fifty or so percent of the length of the program.

Here comes the problem: the human receiver is typically sensitive to a drop off or loss of power. If there is an added fifty percent to the one hundred percent he must strain to absorb, the students' capacity to concentrate has been exceeded. Perhaps it is more ability to concentrate rather than capacity, but there are limits to recoding and putting into storage according to the individual. All the same it takes sustained concentration on the part of all students. If information is presented to a class of students and by testing it is found the students can retain this information at 425 words a minute, this information is not four times the amount they could retain at the normal speed. Perhaps retention of information delivered at a high speed is an acquirable, trainable characteristic. The point to be learned from this experiment is this: the medium affects the message.

REQUIREMENTS AND SPECIFICATIONS

Examples

Audio-Tutorial Laboratory

In the planning stages, the instructor in charge of a course was released from his other teaching for two semesters to work on the experiments and scripts. The production people and the instructor worked together in the process of defining content and making decisions as to how and at what time each unit of the subject matter would be presented. The videotape was developed together with the other components of the course: lab manual, audiotapes, slides and kits. Once the kind of experiment was decided upon, the group wrote the exercise, then did the tape to go with it.

Texas System

When a consortium of college and universities in Texas was preparing to produce a series of high quality instructional materials for interinstitutional use by microwave, the individual institutions' management at the decision making level was involved in the planning stages. The group first agreed upon what were the greatest needs for instructional materials and then worked together, not only in the initial stages but also in continuing involvement for a year or two. This involvement insured acceptance and use by the originators and only slackened when any of the cooperating institutions changed department chairmanships. One of the seemingly small but detracting factors in the continuing involvement of the group was that travel money was available for the designing stages but left out of the budgets for meetings in later years.

Economics of Education

Resources

There are two prime considerations in designing a system to use technology for instruction:

1. The system must be flexible and all component parts must be compatible.

2. The system must be understood to be a noncapital budget item. What this really means is that it is an expendable item. Technology will not stand still; there will always be more and better products, but a system cannot wait for the ultimate. It must be designed for what we now have. We should take the position that we are working with supplies and expenses, rather than with capitalization. As an example, if a new

kind of portable videotape recorder can be bought for $1,500 and used for ten years, isn't it a good investment to do this now rather than wait to spend large sums of money for expensive items or for further technological advancements to take place?

Technology isn't going to wait until educational planning can catch up. The important direction now is to move ahead with what is available at the present time, install it, and put it into use for two, three or however many years it serves its purpose.

The decisions now are on what we want technology to do for education. Is it ideal that every student have available to him whatever instructional material he thinks he needs? If not, what is the ideal? Decide on what is ideal and work with the present technology to get that particular part of the operation developed and amortize the investment.

Specific Operational Instructional Objectives

Instructional goals should not be confused with a statement of course content. Within the course it should be explicit what the immediate goal is. In a math course, for example, the professor should make clear to the students what material the course is going to cover. It is then the responsibility of the professor to distinguish the instruction of the course content from the other factors which he is going to be dealing with -- the technique of mathematics, mathematics as a way of life, how to live with math and be happy, the specialized vocabulary and terminology of mathematics, and all the elements which enter into the presentation of the content material.

SELECTION, TRANSFORMATION AND PRODUCTION

Selection

Search

Is there any sort of information center where an instructor can find out what films, videotapes, audiotapes, or film loops are available? Is anyone doing any kind of information collection so that, for instance, a chemistry teacher teaching an introductory freshman course could find out quickly what films and videotapes he could use? This would be a precursor to the exchange of materials.

SELECTION, TRANSFORMATION AND PRODUCTION

Production

Some of the instructional productions have used professional actors to present the material, and this procedure has worked out very well.

LIBRARY FUNCTIONS

Student Access to Library

One of the biggest errors in campus planning is that the library is often placed in an area not conveniently reached by the students. New audio-visual techniques get into the mainstream of the educational process through student and library channels. The new devices are becoming more and more personal, EVR (Electronic Videorecording), and minidiscs played on $30 machines through AM or FM radio are two new developments. It will be necessary to think through a procedure for the students to have access to these devices and be charged perhaps as lab fees are now paid. The students should be able to check out the equipment and materials they need and be responsible for their care. The institution could charge breakage fees in the same manner it now does presently for the chemistry lab.

Learning Resources Center

Recent thinking redesignates the "library" the "learning resources center." Ideally, a learning resources center should serve three basic functions: indoctrination, production, and distribution.

Indoctrination

This would be an education center with space where planning can take place and where personnel is available to serve in a consulting capacity. These people would not be regular library or audio-visual people but would have dual backgrounds in education and experience and would also spend part of their time teaching.

Part of the indoctrination procedure would involve a massive program on methodology of education. A professor who wanted to redesign his course could receive a month's or two months' leave to participate in a seminar on technology, psychology and methodology at this center. During this time he would have available support to put these new techniques into his course. He could be informed about what films or tape clips are available to show what he wants to show as examples in his teaching. There should be libraries of unique demonstrations or experiences, or even statements made by outstanding individuals, so

LIBRARY FUNCTIONS

that the professor could work any of these into his course. This may seem like the long way around to get new technology into the mainstream of education, it would probably take five or ten years, but eventually there would be built up a trained group compatible with new technology. Faculties are the logical groups to work through.

The indoctrinated faculty member, after working in the learning resources center, could extend his influence by returning to his own campus and organizing a seminar which would provide the same kind of training at his own institution. The training material would lend itself easily to distribution by media.

Production

The center would have personnel to assist in getting the material ready to be utilized and to supply the right kind of audio-visuals.

Distribution

The center would operate a holding, storage and retrieval system in the broadest sense. Ideally, information would be available to students in accessible places, in its best form, and distributed to the learners wherever they are.

DISTRIBUTION STRATEGIES

System

Indiana Telecommunications Network Case Study

The state-wide telecommunications network was created by the state legislature through the enactment of a program to create the State Universities Television Coordinating Council. There are three representatives on the Council from each of the state universities. The Council was given the authority to develop a plan to use $600,000 to get the network in operation. An initial sum of $40,000 was authorized to be used for administrative expenses in getting the Council organized and in writing the plan which would be presented to the Boards of Trustees of the cooperating universities.

The network closed-circuit instructional television for higher education is set on the same band to educational television stations and to public schools. The engineering system allows each additional channel to run down the same band at a little lower cost, so that five channels can be directed to different points by telephone line for comparatively little more money than it costs to send three channels. The different points are designed to connect with other campuses or with distant places on one campus.

In the original planning stages, it was decided that the network would begin operations with the installation of one pipe as broad as it could be made and then channelizing it by creating channels wherever and whenever they are needed. The basic concept was to start where today's resources are, that is, to begin operation and to use educationally what we have now, living with the restrictions as they now exist while learning to use the network facilities.

Technically, the network is commencing operation with telephone channels, which can and later will be arranged in combination with microwave and with closed-circuit television.

Problems

It is only when any one component of the educational process becomes a valid operation to the total university that it can enjoy any degree of success. Even though the network was completed in its technical complexity and was ready to begin operation, the students were not ready to use it. The hoped-for success was not achieved, even though it certainly did help the regional campuses. This was especially true where the campuses had an educational director and interns. The network did find acceptance by those enrolled in continuing education courses.

It had originally been part of the plan that there would be an exchange of materials among the cooperating universities. In fact, the joint concept was built into the development of the materials. There were many reasons why acceptance and exchange of materials were disappointing:

Scheduling. The variations of class lengths, time of beginning of classes in the morning, and duration of terms and semesters in the cooperating universities worked serious difficulties in joint scheduling.

Transferability of Credits. Each university has its own admission standards and its own grading system. When materials are exchanged, they present problems of how and at what level the same courses can be used on different campuses. The additional barrier of credits and fees is difficult to get around. In actual usage, the students who are enrolled in the smaller universities want credit from Indiana University or Purdue when the course originates from those institutions. In the case of education courses, which are rather universal in their design and could be accepted indiscriminately between and among many different types of institutions, the student populations differ so widely in backgrounds and education levels that identical material presents the problems of one grading system for all students. The whole question of comparability of courses is involved.

Fees. One suggestion which has been advanced is for each student's Social Security number to serve as the control for enrollment, payment of fees and assignment of grades.

Implications for Housing. The use of buildings enters into the picture with the advent of the telecommunications network. Students could receive the televised instruction in their dormitory rooms instead of in the regular classrooms. Obviously, this frees space in the instructional facilities and makes better use of the living space.

Technical Equipment. It is a certainty that the network must have all of the participating universities equipped with compatible or complementary technical facilities. In the initial stages, a consulting engineer was brought in to the discussion of technical operating problems. Most of the institutions agreed to accept the norms and standards which the engineer established for the network.

Team Teaching. Many of the courses were adapted to the team teaching technique, but this made it extremely important that there be a means for interpersonal communications between faculty members on the different campuses. These teachers profit from getting together in the preparation necessary for presenting the course material.

Future Expansion

Eventually there will be a master connection to all dormitories and all the apartments owned by the university and occupied by students. This will amount to about 10,000 outlets. Technically this will be feasible, but in operation there are the serious problems entailed in the availability of adequate instructional materials to use on the 12-channel capability. There is also the problem of student isolation -- in a large enrollment situation, what are the sociological implications for students who take portions of their instruction away from classrooms in the privacy of their dormitory or fraternity house rooms? Will this practice have the effect of further separating the students from each other and from important interpersonal relationships? This problem must be given careful consideration in the sociological context by those involved in educational planning.

There are very exciting technological advances now in various stages of perfection which will change the picture so far as distributing information is concerned.

There are electronic and magnetic discs being worked on in the laboratories. No timetable can presently predict the time of availability of these sophisticated devices, they may be one year away, or it may be ten, but there is no doubt that in the context of time technological developments will offer some type of push button instruction.

CONDITIONS OF USE

Dormitory Rooms

Flexibility is the base concern of any telecommunication system. A look at the dormitory room of the future would find a perfected dial access setup, connected to a switching station. Although this may seem far away from the state of technology today, it is certainly the trend of all the developing electronic systems. The perfected system would let a student in his dormitory room, equipped with a television set, dial for audio or videotaped instruction in anything he needs, at a time when he wants to receive it.

From the point of view of the decision makers in educational management, this development would go a long way toward relieving the old constraints of time and space. It would take the concept of instruction out of the mold of the four-walled classroom.

Examples

Medical College of Virginia Case Study

This institution has accumulated a file of videotapes of different lengths, six or seven minutes on the average, each explaining some detail of surgical technique or of diagnosis of a disease. Each videotape deals with a single concept of instruction. The system works with helical scan videotape recorders tied into a computer. The students come to a study carrel, look up the number of the particular tape they want to view, dial into the computer, and observe the instruction on the screen in their carrel. If the tape is in use at the time when a student dials a number, the second person joins the tape in progress, views to the end, and then sees the whole thing from the beginning. At the end of the last running of the tape, the reel rewinds automatically.

Ohio State

The carrel-type instruction at Ohio State has a tape library feeding into the computer of 120 tapes, with 400 outlets connected to the computer.

Audio-Tutorial Laboratory

In the laboratory the science course for nonscience majors has no scheduled lectures. There are twelve carrels set up with the tape-recording in which the course instructor guides the student through a set of exercises. In life science, the demonstration equipment the student uses includes a microscope, a cartridge, and a projector. The student works at his own pace through the material; the average time is about two hours. In this laboratory, the student can call upon the professor for help. The professor on the tape who designed and presented the material is the same person available for guidance in the laboratory. This works out to be a great asset in the success of the laboratory. It is also very feasible for economic reasons and has the additional advantage of freeing the professor from the burden of the menial work of the course.

EFFECTS ASSESSMENT

Ways of Measuring

When instructional materials have been carefully programed and meticulously tested, as in the case of the high school science series, PSCS, and then, when put into a real classroom situation, it becomes evident that the teachers are not qualified to teach the material, the question arises: Why wasn't this deterrent known in the testing period?

Even though it is too late in the specific instance of PSCS, it is important to learn from the experience of this series. The material developers in higher education made the decisions of how, where, and with what students to test the course. The university professors thought back to their best students during undergraduate years and on through graduate school, who became the best teachers of high school science, who, naturally, were employed by the best school systems, and, again naturally, who were given the best students to teach. The testing results showed that the courses were effective.

The same materials in a condition of use situation where the teacher is average, the school system average, the students average do not prove effective.

The lesson to be learned is obvious.

Examinations

Would it be possible to adapt the examination system developed by the University of Chicago? This system, called the Great Exam, is highly effective. The Great Exam was worked out in the humanities department with the Learning Resources Center. The exam was designed so that the degree to which the media were succeeding or failed would be obvious. No professor in the humanities department gave his own exams. Each one wrote a set of questions he considered important, and all questions were considered by a committee and a designated number selected to be included in the Great Exam. The students had access to anything they wanted to learn in any form they want to learn it, entirely on their own. The only criterion for success: Could they pass the exam? There were a variety of goals and objectives of the course, and these could be met by certain of the media more satisfactorily than with others. The relative value of the characteristics of each of the media for learning shows up distinctly. The result is a neat sorting out of the media.

Case Studies

Two series, one in chemistry done by John Baxter of the University of Florida and the other in psychology by E. G. Boring of Harvard, show very clearly the problem of finding the real effects on the target audience.

Dr. Baxter's course, a proficiency development chemistry series, met with great critical approval by his chemistry colleagues who consider him an outstanding teacher. The students who took the course just couldn't take him. Although the first two or three programs met with some degree of student acceptance, the novelty soon wore off. Now comes the question of how important either colleague acclaim or student resistance is to the amount of learning which takes place. There is no evidence that the ability of students to appreciate or like a presentation has any direct bearing on the amount of information transfer which takes place. Additionally, the ability of their instructor to appreciate and enjoy the same presentation has even less effect on the degree of learning. The Baxter series becomes an indictment of the lecture method, rather than being a question of the man or the medium being ineffective.

In the Boring psychology series, the lecture method again comes under scrutiny. Dr. Boring is a man of great personal charm as well as being an excellent teacher and a reputable psychologist. The profession raved over the programs; the students generally thought Dr. Boring was a funny old man.

Behavior Change

The quality of instructional materials closely affects all the communication sequence, when quality is judged as to the behavioral change produced in the target audience. This puts the requirement upon the producing group to make the materials of such quality that the students know they are learning and the instructors know they are learning.

When the criteria are established, they are so gross that they cannot be used to determine behavioral change. They do not provide detailed information. They do show whether or not grades have improved, attendance throughout the course has been maintained, and interest has been sustained. All of these criteria depend on subjective and observable evidence.

The only criterion of quality should point to the use of the material. Is it used? Is it usable? Is it accepted for interinstitutional use? In other words, if Notre Dame produces a program, will it be accepted and used by Purdue? Quality is not a production technique. Because there is practically no usage in higher education, or even minimal acceptance by any institution other than the one which produced the material, the real problem lies in the internal and management organization of the institution. The first step to face this problem is to identify the decision makers. If this were done, then these administrators or department heads could be brought together for an indoctrination effort. This effort would be designed to make these decision makers recognize the role they do play in the system and then to give them whatever information they need to make logical decisions. Any other approach to the eventual exchange of materials is futile.

ABSTRACT

UNIVERSITY OF ILLINOIS

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

November 2 and 3, 1967

ABSTRACT

UNIVERSITY OF ILLINOIS
SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
November 2 and 3, 1967

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DISCUSSION TOPICS: Page

REQUIREMENTS AND SPECIFICATIONS

- Design Strategies 1
- Quality 1
- Acceptance of Media 2
  - Incentives for Instructors to Teach on Television . 2
  - Incentives for Institutions to Teach by Television . 3
- Acceptance of Instructional Materials 4
  - Interinstitutional 4
  - Secondary Education 5
  - College Courses on Commercial Television 5

SELECTION, TRANSFORMATION AND PRODUCTION

- Extant Materials 6
- Specific Steps in Course Development 7
  - English Example 7
- Production Situations 8
  - Production Team 9
  - Production Centers 11

CONDITIONS OF USE

- Teacher Training 12
- Dormitory Viewing in Colleges and Universities 12

EFFECTS ASSESSMENT

- Ways of Measuring 13
  - Examples 13

ILLINOIS

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

In the design of a course, the objectives should follow a sequential pattern. The students should have a base of knowledge at the beginning of the course, identified not merely on the basis of prerequisite courses, but carefully defined in terms of specific information and skills. From this base of knowledge, detailed lesson objectives should be worked out as the course develops, and test questions should be made up for these objectives. The best practice is to try out and revise to a standard during the production process. This procedure can be refined so that, for each 50-minute lesson, there are about 25 or 30 specifically identified lesson objectives. For college level courses, this works out successfully, but it is difficult to use this procedure for elementary school programs because the information has to be presented in a more general form.

Quality

There seem to be two extremes operating in the area of quality of instructional materials: either the course is bright and interesting without much concern about the content or it is presented by a very detailed plan for the organized content in a dull and uninteresting way. What hasn't been worked with at all is a way to use the full potential of television, making lessons colorful and bright but with the highest degree of excellence in the content material. The color and brightness, referred to in commercial television circles as slickness, should be brought in to make illustrations clear and to demonstrate through pictorial means the points the professor is trying to make. For instance, instead of the traditional television close-up of the face of an economics professor lecturing about the circumstances during the depression and the bread and soup lines, the screen should show film clips of dejected people cold and hungry waiting in lines to get a bowl of soup and a piece of bread. Motion pictures and television programs can be profound learning experiences. What makes a televised lesson into an adventure in learning is the talent of a person with a flair for imaginative production who has carefully developed significant and important material for presentation. In this case the slickness is evident, but only as a by-product. The producer has given detailed attention to organization and then used the resources of media to operate in making a bright and significant program.

REQUIREMENTS AND SPECIFICATIONS

Acceptance of Media

Incentives for Instructors to Teach on Television

The atmosphere relating to the decision by a faculty member whether or not to teach on television varies according to the department in which he teaches. Some departments encourage a young teacher to teach on television, but most department heads would rather see a rising faculty member put emphasis on research and publication. In combating this tendency, there should be some system of rewards for the television instructor. The honorable way to reward the person who does an outstanding job of instructing on television is to recognize his contribution by regular salary adjustments. This is the realistic, fair arrangement to face realities and to provide a sufficient incentive to attract the best qualified teachers. This should be in the form of a permanent increase in salary merited by the sustained contribution the television professor is making. In cases where a professor makes a single concept film or does only one television program, some other way of paying him for his services should be worked out. Some teachers who have made half-hour television programs for special purposes have received $25.00 per minute for the length of the program air time. Others are paid an agreed-upon sum for their presentation and an additional percentage of the profits earned by the program. There are many legal copyright complications to be considered in this connection before any agreement should be made.

Another incentive to bring the best teachers before the television cameras would be to create some sort of Great Television Teacher Award. This could be established by a foundation. Perhaps the Award could be given by a foundation for significant increase in the quality of instruction and carry a sum of money to be added to the recipient's salary.

The success of the campaign to attract good teachers to the MPATI productions was based on the incentive of offering the television teachers an increase of twenty-five percent above their regular salary.

Although it is agreed that some sort of adjustment must be made to provide the incentive for teachers to teach on television, the medium can never compete with the financial rewards which accrue to the teacher who writes a textbook. The leading economics textbook author is said to have earned over $500,000 from his royalties. This kind of competition, even for authors of less widely used textbooks, attracts toward publishing and away from appearing on television.

However, a professional person places a high value on the rewards given by his own professional group. Through teaching on television, an instructor can project a national image and can achieve wide visibility not only within his own institution but on a nationwide scale. This can be made an important factor in inducing good teachers to enter the television medium.

Within a department, using the University of Illinois Psychology Department as a case in point, the senior professors were teaching the basic courses. They were anxious to be relieved of these assignments and were enthusiastic when they had the chance to teach on television as an alternative. This reassignment in itself was a kind of reward, but it carried additional benefits in the form of additional staff support.

It is possible for a television instructor to profit in yet another way. When supplementary printed material in the form of lesson guides is written by the instructor for the student to use in following the television course, the instructor can copyright his work and receive payment for its use.

Incentives for Institutions to Teach by Television

Whereas departments give rewards to their faculty members, and either provide incentives to teach on television or discourage their instructors from appearing as a television teacher, what are the incentives for a department to put its courses on tape?

In some instances, the wide use of the courses they have produced has built up departments. In addition to the prestige which accompanies the acceptance of the programs they produce, departments place a high value on the economies effected for themselves by marketing their programs to other institutions.

One of the barriers against a department using media is that this is a departmental expense. In a traditional classroom situation, the student pays for his own textbook and the materials necessary for the course. Using media is an institutional expense; the student cannot be expected to pay to watch television.

REQUIREMENTS AND SPECIFICATIONS

There are ways for an institution to recover the cost of renting films. This can be done by adding a fee, perhaps an extra $10.00, to cover the cost of obtaining the material.

As to producing courses on television, a department must have in the vicinity of four hundred students in a television course to recover the production costs. This economy would provide an even greater incentive if the videotapes were marketed for use by other institutions.

However, economy is only one factor. Colleges and universities should be led to consider that the real benefits lie in terms of improved quality of instruction. Another incentive stems from the savings in time which result from the practice of outlining objectives for the course and from these furnishing the students with a "map" of what is going to happen in the course. For instance, most six hour courses could be cut to four hours by using this practice. An additional consideration is that departments using television find that the students enjoy the learning experience, even term it "fun," when television instruction combines good information and pleasing method of presentation.

Acceptance of Instructional Materials

Interinstitutional

Particularly in the area of higher education, acceptance of instructional materials produced by one institution for use in another or even for use among branches or departments of the same institution is difficult to obtain. If quality can be improved through the concerted efforts of a production team staffed by experts in content and technical areas working in a production center with adequate financial support and equipped with the necessary facilities, then there must be a strong effort to have the resulting programs and courses accepted and used to the best possible advantage for the largest possible audience. The effort must be on a national level and the instructional material must bear a status label.

One of the basic problems in gaining acceptance for courses mediated by television is that faculties, in general, don't trust people outside their profession. There must be professional concensus before acceptance is possible.

REQUIREMENTS AND SPECIFICATIONS

Secondary Education

In the area of secondary education, the picture is somewhat different. It is safe to say that the course content improvement project in high school science has had an enormous impact on this field of education. This project was developed by the Biological Science Curriculum Study Committee with support from the National Science Foundation and is now in use by about two million high school students.

Let us examine the ways this project gained such a high degree of acceptance. Hundreds of high school biology teachers were brought together while the materials were being written. Each teacher was selected because he or she had been identified as being outstanding and thus the consulting teachers acquired a status within their professional group. Since it is most likely that good teachers come from progressive school systems, the materials were being put together by the best teachers from the best school systems. After the course was designed, these same teachers used the materials for a year in their regular class work. Materials for this BSCS high school science program were "packaged" to make a complete course. The supplementary kit consisted of books, manuals, unit exams, final exams, suggested lay-outs for laboratories, bibliographies, pamphlets and the like. After using the course materials for a year, the teacher consultant group was reassembled so that the program could be evaluated. Suggestions for improvement were made and the materials were rewritten. This process was lengthy and costly, but the final product proved out to have excellent quality and this, along with the status factor which automatically derives from the NSF emblem, assured acceptance and use from a large number of school systems. Another reason for the gratifying acceptance is that the teacher consultant group generated a high degree of enthusiasm for the method of developing the course and became a force in publicizing and commending the materials so that a clientele was established by the time the complete program was ready for distribution.

College Courses on Commercial Television

The BSCS process of developing a course can be contrasted with the method used in producing a series of college-level courses in statistics and economics for use on a commercial network. The television instructor was a highly competent teacher and the course content was the same as is taught in economics courses in at least 500 colleges and universities. However, with the teaching at an above average level and with the standard content, the result was not really good instruction. The failure stemmed from several sources:

Poor Production Quality

The programs were dull, there was no attention to elements which contribute to a slick production.

Inadequate Organization

The programs could be considered satisfactory if used as isolated units, but there was no "packaging," that is, the programs stood alone with no supporting and supplementary material.

Lack of Preparation

In the planning stages, the material was assembled without determining the objectives, without writing detailed specifications, and without preparing an outline or even an examination.

Poor Production Procedure

The arrangements were worked out for the most part by mail, the instructor flew into New York the same day the production was to be filmed, and the guests who appeared for interviews were not given sufficient rehearsal time to allow them to become relaxed and comfortable in the production situation.

SELECTION, TRANSFORMATION, AND PRODUCTION

Extant Materials

Whenever a need for an instructional program is identified and described, the first step should be to make a search to see if suitable material already exists. Most often when entire courses or large units of information are viewed and evaluated, the decision is that they are not acceptable. The working rule seems to be that large units do not transfer, but small units do. Small units, or micro materials, can be incorporated into the televised lesson and contribute immensely to the value of the material. Such micro materials as recorded perceptual phenomena, graphs, charts, and film clips are easily transferred, but the problem is to know what is available and how it can be obtained. Unfortunately, this kind of material is seldom used from one university to another and the research work and developing of these micro materials goes on over and over.

Especially in a field like economics, a catalog of materials describing all the graphs, charts, and organized statistical material would eliminate the necessity of this duplication. The material exists, but there is no system to make it readily accessible.

In looking toward wider utilization of existing television courses, not only is it very difficult to find acceptance by one college or university of material developed by another, often there is the same resistance to transferring recorded material between branches of the same university. The time to explore the widest use of televised material is at the time of design of the course with an effort toward getting interinstitutional and intercampus cooperation built into the process of production. The only way for this cooperation to be effective, however, is to have the decision at the departmental level or above.

Specific Steps in Course Development

English Example

Let's follow the course of events leading up to the production of a film. In an actual case, an English professor walked into the university instructional materials production center with an idea for producing a film on the history of the English language. He felt that the subject matter deserved more attention than he could give it in the hour he spent giving the class lecture and that this was not only true for him but for all the other English professors teaching virtually the same course.

At this point, it should be pointed out that the English professor had already made the decision that a film should be made. He had not even considered making a search to find if there was a film which would serve his purposes or could be adapted for his use.

As a matter of strategy, if the media specialist should now bring out the model (see chart) for developing a unit of instructional material and face the professor with the task of thinking through the film's objectives, it will probably be the end of the professor's idea of a film on the history of the English language. In practical situations, the first step is not really the top of the model; the important thing in the beginning is to capture the interest of the professor or the person who has initiated the idea for producing the material and then carefully lead the way around to thinking through all the objectives toward which the film or television program should aim. In this actual case, the media specialist and the English professor found that there were four films dealing with this subject matter, and together they looked at rental copies. For different reasons, none of the four met the objectives. The English professor gave as one of his reasons for rejection the film's emphasis on the influence of the Danes. Rather than depend on the opinion of one person and also to generate interest in the project, the other members of the English department were asked to view the films and make their comments. Understandably, there was considerable disagreement. This is an inherent part of all content, and should be brought out in some way so that all scholarly points of view are given attention. What is needed here is a procedure for handling this kind of intellectual disagreement and deciding what views are acceptable. Since the concensus was that the existing material was not usable, the next step was to develop a videotape version of presenting the material. The tape was then tried out in a classroom situation with students. This was done as a test of the value of the lesson using rough and crude visuals. Later, if it was necessary to revise the content material (in this case it was) the film version could be produced with more attention to better production techniques and with more pleasing visuals. The object lesson in this sequence of events is that when the idea originates with the subject matter specialist, it is not possible to start at the top of the model or, in other words, at the beginning of the production chart.

Production Situations

The typical television production studio is a poor place to create instructional materials. What is needed is not a studio and not a classroom, but a specially designed area for production. This area should reflect the educational context, that is, it should have seating for students. Having students present when the television teacher is making the recording of the lesson provides a means for the student viewers to react and gives them a group with which to identify. Students taking the instruction by television will learn from the class discussion when the students who were present during the production fumble around for an answer. Actually, this natural hesitation helps the viewer students make up their own minds about how they would answer the same question.

SELECTION, TRANSFORMATION AND PRODUCTION

This kind of a production situation was described when a number of television instructors were asked to give their ideas of the situation in which they would like to work. They wanted to teach to students, with the cameras and equipment either hidden or unobstrusive, focusing back and forth from the professor and the material he used for demonstration to the students. The students would, of course, be aware that the cameras were there, but they would not feel that the emphasis was on the recording procedure. The professor, on his part, would be comfortable in this intellectually oriented kind of a production situation, rather than trying to teach in a television studio where the atmosphere is hectic, noisy, and alien.

Production Team

The television instructor should have available to him the services of a number of people who will work together in different but related ways. This should be worked out without creating an overwhelming effect on the professor who wants to do a good job of teaching his course on television. The head of this service group would be the director, and the group supporting him would be experts in their own area operating as a team. The team members would be a programer, a measurement and testing specialist, an artist or graphics designer, several professional colleagues, administrative assistant to the director, and administrative assistant to the instructor.

What sort of qualifications would be required for the director and for the production team members in an ideal situation? Let us design a team which will produce a course in economics for television.

Director

A good director would combine his technical "know how" of finding the best possible ways of presenting the material for the course with a working knowledge of economic concepts. He would be willing to take the course he is producing in order to have the kind of understanding he would need to create a product which will meet the course objectives. He would read the textbooks, and be able to absorb the academic concepts, but beyond that he would have to be creative and think of many imaginative ways of translating the factual information into the most comprehensible terms. He will be able to interpret the material in audiovisual terms and know when it is appropriate to do so. He must really know media and the extent of their possibilities.

Programer

The programer in this role of a television program assistant would be concerned with the course content and be able to arrange the material in sequence so that the thought development followed a logical pattern.

Measurement-Testing Specialist

The measurement-testing specialist must be able to develop measures that are good enough to command respect from teachers and subject matter specialists. He must be able to say when items really test. Additionally, he must be able to interpret the information.

Artist

The artist or graphics designer must be skilled in creating visuals which are esthetically pleasing and which make clear and understandable the information being presented by the instructor.

Critics

This group should be composed of persons in the instructor's field, not teaching assistants, but knowledgeable and experienced colleagues. The function of this group would be to suggest improvements, assimilate the material for the purpose, in the case of the economics course being used as an example, of assuring that the presentation is sound economic theory and accepted practice.

Administrative Assistant to the Director

The administrative assistant to the director would be the person responsible for setting up conferences with faculty advisors and students, arranging for the tests to be given, coordinating the work of the team members, handling correspondence, and assisting the director with other arrangements and administrative and clerical details which come up during the course of the production.

Administrative Assistant to the Instructor

This person would be the academic counterpart to the director's administrative assistant. He would carry out the administrative and clerical work involved in running the course work and assist the instructor in assembling material and in working with the large numbers of students who are taking the course.

SELECTION, TRANSFORMATION AND PRODUCTION

Team Interactions

Continuing to project an ideal situation, this team, once the members have been selected and assembled, should have a sufficient amount of time to learn to work together and to perform their specified assignments within the group. This time factor is important -- team members have to learn to adjust to their own responsibilities and to appreciate and understand the work of the other team members. Six months is an absolute minimum period for a team to produce a course; two or three years would be a more appropriate length of time for a team to create a quality product.

Production Centers

The production team, composed as it is described in an ideal situation of persons specifically and uniquely qualified for their part in the production and functioning together in a comfortable manner for an extended period of time, obviously could not be established by or for any one institution. It would be economically impossible for a college, university or school system working independently to afford such a production arrangement.

It is equally obvious that this kind of production team could not be assembled to work on one project.

The narrow "one institution-one project" view must be supplanted by a much wider one, looking toward some kind of interinstitutional organization which would be financed collectively by the cooperating institutions, with help from the federal government or with support from foundations.

There are many barriers inside and among institutions of higher education which preclude the formation of an interinstitutional organization for this purpose. However, society can afford the kind of quality product which would result from the efforts of such a production team.

Model

Perhaps the only way for a cooperative arrangement to come about is by setting up a model. The place for production would have to be a facility where the production team staff could stay together, working at some kind of center and producing quality courses for use by large numbers of students. This is the only way quality programs will ever be economically feasible -- by gaining acceptance nationally as excellent quality and therefore status programs and through use by large numbers of colleges and universities to teach large numbers of students.

CONDITIONS OF USE

Teacher Training

When information is to be disseminated, the usual method is to think in terms of bringing people to the source of information. For example, in the area of teacher training the customary practice is to set up a summer institute and bring in four or five hundred teachers for special training. As an example, when there is a change in curriculum which is extremely important for teachers to understand themselves before they can properly explain the material in the classroom, regional summer institutes will be established. With the rate of retirement and job changing in the teaching profession, the limited number of teachers who can be trained in summer institutes will never catch up with the need for the training.

Television should be considered as an alternative method of inservice teacher training.

Dormitory Viewing in Colleges and Universities

A further example of the unjustified constant effort to accommodate to the learner occurs in higher education instruction.

In several studies to determine the degree of success of televised instruction, the results have shown that the most satisfied students are those who would not otherwise be getting the information. These people are the housewives, the businessmen, the handicapped and the shut-ins who place a high value on the instruction and who conscientiously commit themselves to the time when the course is televised.

On the campus, it may be possible to establish a different use pattern than is now generally in operation and in doing so to gain acceptance by the students and the administration.

A rule which should be examined in any consideration of how television can be used in a campus situation goes like this: The price for learning is adaptation to the instructional situation.

Those who oppose television instruction in favor of the traditional student in the classroom face to face with a teacher argue that social facilitation plays an important role in learning. However, there is no clear way to tell when this kind of student interaction is taking place.

CONDITIONS OF USE

When television is used on campuses outside the classroom, it is usually viewed in the recreation area of the dormitory or fraternity house. Obviously, this area is unsuitable for quiet concentration. At Michigan State there are Living-Learning Centers which allow the releases of the classroom to operate in combination with comfortable, convenient settings for individual study.

Students seem to accept televised instruction mostly on the basis of convenience, that is, they are more apt to watch a television lesson where they live if the lesson is shown at a time when they will be at the same place either immediately before or after.

At some institutions, there are subtle barriers to the use of television. If the dormitories are financed by bonds and if the student housing fees are paying off the bonds, some institutions claim that the space must be for living and not for learning. This interpretation actually means that students can't be expected to pay for the learning areas. Additionally, in some states, the formula for generating classroom space worked out by the Board of Higher Education does not permit learning space to be built or used in dormitories.

A re-examination of the kind of conditions necessary for the optimum use of television in colleges and university instruction should challenge the assumptions which erect these barriers and should result in the establishment of new and different use patterns.

EFFECTS ASSESSMENT

Ways of Measuring

Too often testing, if done at all, is done in a superficial manner. Most testing consists of the recall of factual and conceptual kinds of data. If the final goal is a quality product, then it will be necessary to go much further in measurement than is now done. If tests are based solely on Bloom's taxonomy of educational objectives, they will never probe to the necessary depth or search for profound understanding.

Examples

Here are two methods of testing now being developed which could serve as models for finding good measurements to be used in creating quality programs.

EFFECTS ASSESSMENT

Indiana Medical Center

One method, developed by George Miller at the Indiana Medical Center, uses taxonomy as a basis. Mr. Miller asks the department faculty in the course being evaluated to classify the information and the conceptual material which fit into the taxonomic levels to be sampled. He gets test items at these levels, then confers with the faculty to determine whether or not these items are appropriate for these levels. At this point he writes specifications in terms of the content to be covered and the taxonomic levels agreed upon. This method provides the means for the faculty to study the test results not only on an over-all basis but separately on each of the various levels.

University of Illinois

Another method is being worked out by Richard Spencer (University of Illinois). He is collecting all statistics on a wide variety of courses, in fact, most of the general college level courses, from a large number of institutions. From these statistics he is developing a test item bank. From this bank tests can be assembled using the questions which stand up against item analysis criteria. The tester would be able to make judgments about where the test items fit, both as to content and depth.

ABSTRACT

THE PENNSYLVANIA STATE UNIVERSITY

SEMINAR I ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

November 20, 1967

ABSTRACT

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SEMINAR I ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
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DISCUSSION TOPICS:

SOCIAL NEEDS

Page
- Population 1
- Extent and Kind 1
  - Education of the Disadvantaged 1
  - Adult Education 2

GENERAL PURPOSES AND GOALS

- Instructional Objectives 2
  - Motivation of Students 2
  - Peer Group Reinforcement 3
- Role of the Media 3
  - Characteristics 4
  - Teaching 4
- Federal Programs 5
  - Planning 5
- Specific Instances 5
- Behavioral Objectives 6
- Operational Objectives 6

REQUIREMENTS AND SPECIFICATIONS

- Design Strategies 6
  - Research Development and Application in Mass Media . . 6
  - Quality 6
- Specific Operational Instructional Objectives 7
- Acceptance of Media 7
  - "Slippages" or Barriers 7
- Acceptance of Instructional Materials 8
  - Secondary Education 8

DISCUSSION TOPICS (cont'd) PENN STATE I **Page**

SELECTION, TRANSFORMATION, AND PRODUCTION

- Production 9
  - Production Team 9
  - Production Centers 9

LIBRARY FUNCTIONS

- Utilization of Resources 9
- National System for Depositing and Retrieving 10
- Distribution and Classification 10
- Transmission or Distribution to Places and Points of Use 10

CONDITIONS OF USE

- Examples 11
  - Medical Profession 11
  - Museums 11
- Time 11
- Context of Use--Learning Environments 12

LEARNER INTERACTION WITH PROGRAM MATERIALS

- Applied Learning Principles 13

EFFECTS ASSESSMENT

- Ways of Measuring 13

SOCIAL NEEDS

Population

Far too often discussions of social needs center around those of the middle class. An equally, if not more, important target audience is the persons in the so-called "disadvantaged" urban and rural areas. For instance, in the San Francisco Bay area there are 300,000 Spanish-speaking people, most of whom cannot speak English. Of these most have not or will not graduate from high school. Both children and adults could find great benefits from instructional television in dealing with their problems of language, health care, and employment.

Extent and Kind

Education of the Disadvantaged

Social demands of underprivileged persons are very different from those of the middle class; thus the hierarchy of goals will be different. Although it has been shown that among high school students in low-class areas the median time of television viewing per day is four hours as compared to two hours in high-class homes, lower-class children are less likely to watch an instructional television program. Lack of interest in education in their homes accounts for this. This antipathy may be associated with the higher dropout rate among the lower-class school children. These people immediately disregard anything resembling instruction of the traditional variety.

However, the introduction and acceptance of instructional television in deprived areas could alleviate both local and national problems. If instructional television is to be extended to groups other than intellectuals, it must make a direct appeal to them. It will then find itself in competition with commercial television and will have to develop programs of comparable or superior quality. For instance, although the kind of a program which could be titled "How To Improve Yourself" would not appeal to many Negroes, perhaps a show featuring talent from a Negro theater or a street show staged by Negro youngsters would gain attention among the local population and give them an incentive to watch instructional television.

To avoid the sense of remoteness often conveyed by television instruction, groups from the target audience could occasionally be shown discussing their problems and interests, such as language difficulties, employment opportunities, and medicare. Specialized messages often cause persons on the fringes of the ghetto to become involved with its problems.

SOCIAL NEEDS

WBBM, a commercial radio station in Chicago, carries a program which takes a stand on contemporary issues such as race, money management, and child care. People may call in on any of 24 telephone lines to express their opinions and to receive additional information. For instance, during a discussion of child-training practices, a psychologist was available to refer people to appropriate agencies for more effective help. In many ways commercial media is in very close contact with a wide range of people and often serves an instructional purpose.

Adult Education

Another little-mentioned target population is that of mature women who have raised their families and desire to play a new role in life, whether it is to gain a new outlook on the contemporary world or to acquire a new skill.

GENERAL PURPOSES AND GOALS

Instructional Objectives

Harold Howe, II, U. S. Commissioner of Education, has suggested that the entire school system must be redesigned in order to change to the objectives needed to improve the quality of education. However, instructional objectives are not as yet clear. In colleges, for example, instruction is fitted to the needs of the instructor rather than to those of the students. Many courses are used to select out the best students, thus allowing only persons who are trainable or compatible with the present system to succeed. It is this confusion of instructional goals that results in much of the weakness of university education in particular.

The artistic capability of the media pervades each of the sequential operations of the instructional system but is perhaps most important in relation to instructional objectives. In this sense, the media may be used to reorder cognition, imagination, and perceptions so that new relationships and impacts can be developed.

Motivation of Students

In order to satisfy the needs of the students, differences in goals and educational levels must be considered. Important differences in the use of the media depend upon whether they are to be used for elementary, secondary, or university instruction; for introductory or advanced courses; or for commonwealth or main campuses. Also the varying goals of students within an individual classroom must be considered. For instance, when there is only one introductory course in a curriculum, many different types of students take the course; those who take it only because it is the one requirement in that field, those who are taking it as a prerequisite for a course they are interested in, and those who are specializing in that particular field. Due to such diversified interests, the course material is often really applicable to only a very few of the participants. This situation may be alleviated somewhat by the use of laboratory media which may be utilized by students who desire more intensive information in an area. The situation is also improved if teachers are willing to state the limits of their knowledge, simultaneously encouraging the students toward further individual discovery.

Peer Group Reinforcement

The teacher is not necessarily as important as is commonly thought; there is certainly no need for glorifying an incompetent teacher. Students learn much in the elementary schools and undoubtedly throughout the educational processes from older students. Interaction at the peer group level is much more frequent than between the student and the teacher, as the instructor is overwhelmed by the number of students and usually cannot know them individually.

Role of the Media

Media serve the functions of dramatic impact, emotional involvement, displaying of details that cannot be shown by the teacher in the classroom, compressing of time as in time-lapse films that show the germination process in the growth of plants, and capsuling information to give an overall perspective as in historical films. An example of using a medium to exhibit a phenomenon that would otherwise be impossible is a color film of an experiment with barium gas used in conjunction with the classroom teacher's explanation of the reaction and the descriptive formulas. This kind of utilization is not limited to the experimental sciences; great use of the media could be made in social studies as well. For instance, news coverage may be done in a depth never before possible by introducing instructional materials into the classroom. What better way is there to show the effects of war than visually!

GENERAL PURPOSES AND GOALS

The function of the media is not necessarily as a disseminator of facts but as a device to increase stimulation and involvement. Media could well be incorporated into the model which states that the first step in the educational process begins with a power stage in which the material makes an impact on the learner, and a relationship is developed between teacher and learner. The second step is the provision of the learner with the methodology for personal investigation. In the third stage, the learner is given the opportunity to carry out individual research and to become involved with selected problems. If this model is accepted, the media may perform an important function in the first stage as a dramatizing agent designed to stimulate the student interests. Utilization of the media in this manner has been found to be very effective. The George C. Scott television series about a gallant social worker, East Side--West Side, was shown in a civics class. The particular drama enacted concerned a Negro family who moved into a middle-class white neighborhood. The film had an inconclusive finale. It was dramatic enough to involve the students to the extent that they spent ten days researching and contacting the NAACP for material and information. In this case, the medium was used to convey the importance of a contemporary crisis and enabled the students to transcend the rote ritual and routine that permeates most traditional instruction.

Characteristics

According to Marshall McLuhan, the media do have a message; radio, films, and television all have different characteristics and different images. Research in this area is necessary to determine the most appropriate usages of the various forms of media. It is known, however, that excitement and interest can be generated more by observing a phenomenon than by merely listening to or reading a second-hand description of it. In McLuhan's terminology, television and film cause an involvement of all the senses in the act of becoming immersed in the media.

Teaching

Most teaching methodologies are designed for optimum conditions that are not met in the schools. Frequently teachers lack the assistance and techniques for carrying out their functions and roles properly. Furthermore, although the teacher is usually portrayed as a sympathetic individual whose function is to assist the student in every possible way, this is often not the case. Due to unwillingness on the part of the teacher or to the student's shyness, the use of a teaching machine or other such device is often more efficient than the efforts of the teacher. The role of the teacher, when released by the media, allows time to develop excitement and effect responses or to help the student relate himself to his newly gained knowledge.

One important attitude held by some persons is that the media must not be used to replace the instructor, but must be used rather as forms of support and assistance to the teacher, to gain attention and involvement, to explicate difficult information, and to reinforce and dramatize materials that the teacher is presenting. The media must be unobtrusive in that they do not take the focus of attention away from the teacher. Also, the media must always be evaluated in terms of the way in which they support the classroom teacher, not in terms of the way in which they replace or displace him.

Federal Programs

Planning

The federal government should be advised to require more than the recommendations of any one professional organization in the planning of instructional materials.

Specific Instances

An unusual use of the media is presently being carried out in a class of sixth graders in a Jersey Shore, Pennsylvania, elementary school. The object is to improve the writing ability of children who have had five unsuccessful exposures to traditional teaching of writing methods. The instructor uses everything the media provides. For instance, she combines a few bars of music from different melodies with slides of diverse scenes and directs the children to write whatever comes into their minds. She then feeds back some selected portions which have been written by the students, without identifying the author, and asks the class for additional comments. After three exposures to this, their writing ability shows a definite improvement. She also plays familiar popular music and asks the children to make up their own lyrics. They often substitute words for those they can't remember and develop partly original songs. This is only one example of how complete abandonment of traditional teaching methods has proved superior to the latter.

GENERAL PURPOSES AND GOALS

Behavioral Objectives

Educational objectives are most reasonable if stated in behavioral terms. Objectives should reflect behavior that the target audience wants and needs to know. So far educators have not clearly defined their objectives. This is the crucial initial step in the design stage of producing instructional materials.

Operational Objectives

Several steps could be taken to increase the effectiveness of instruction in general. The first of these is to update concepts and to relate explanations to contemporary life. Secondly, generalities and specifics should be taught together. Far too often so much emphasis is placed on details that the general principles are totally overlooked. Novelty (such as the use of cartoons in mathematics to show its historical perspective) should be introduced into the learning situation. Relevancy may be increased by providing a kit for a television chemistry course and by coordinating the lectures with what the student is doing by himself. Finally, the illusion that the teacher is an authority and that he is dealing with completed material must be destroyed. The student should be made to feel that he is capable of adding creatively to a subject area.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

Research Development and Application in Mass Media

Research is needed in the following key areas affecting the quality of instructional materials: (1) objectives of particular kinds of instruction; (2) the most effective presentation of the instructor; (3) factors influencing the acceptance or rejection of instructional materials by the classroom teacher; (4) the conditions that maximize effectiveness of media; and (5) means of motivating the public to watch instructional television.

Quality

Some laboratory experiments have concluded that learning outcome from films is not correlated with high technical quality, and that technical quality does not affect involvement. In one such study, the quality of the instructional material was deteriorated from color to black and white, then to an inferior black and white version, and finally to a simple animated version on slides which eliminated the motion picture effect entirely. No significant differences were found in learning. In other words, films which cost $10 per minute were just as effective as those which cost $1,000 per minute since 90 percent of the total cost was devoted to the achievement of high technical quality. However, these findings must not be generalized to all the populations and they are misleading outside the laboratory since people under present-day circumstances will not watch programs of poor quality. Certainly the initial impact of the media is improved by high technical quality. This is especially important in the media that are distributed to teachers to inform them of new instructional methods.

Specific Operational Instructional Objectives

When to use the various communication modes -- sound, animation, visual representation -- is more of a problem than when to use the different media. Features of design, such as cost, must be considered in the selection. The proper organization of materials is more important than merely increasing the variety of media available. Robert M. W. Travers* has found that simultaneous presentation of auditory and visual information that is 100 percent redundant in its content may add nothing to learning. Although this conclusion was supported by mean list scores, examination of variances may show that in a given population some people may learn better visually while others learn better by listening. This type of result could be substantiated only by examining individual cases since the effects would cancel out in the test population.

Acceptance of Media

"Slippages" or Barriers

The high-powered intellect devoted to developing learning methodology, modes of instruction, and instructional media has not permeated down to where it is needed -- at the actual teaching level. Teachers do not know the new techniques, and schools will buy hardware with no conception of its use. For example, one school bought 20 color television sets in an area out of the reach of educational television stations which produced programs in color. Lack of interest in the universities, especially schools of education, may be a partial reason for the misuse of technology in the lower levels. Information of occurrences on the lower level must reach the university researchers in order for them to be aware of improper practices. However, in general, the problem of public school teachers is not the misuse of the media, but it is the difficulty of keeping up with changes in their fields. This becomes more acute at the junior high level than at the elementary level. Instructional television has an urgent function to help teachers keep abreast of developments in their fields. Programs should be scheduled more conveniently for the teacher.

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*Paper entitled "The Transmission of Information to Human Receivers" delivered at the meeting of the Division of Educational Psychology of the American Psychological Association, September 5, 1964.

Faculty Resistance

A factor of greatest concern to most faculty members is availability of media which means more than the mere presence of films and videotapes. It would be desirable to have a regional or centralized staff whose job it would be to determine what teachers want and how they want it organized. It would be the duty of the staff to seek out the instructor and adapt the media to his demands. This would enable the instructor to make suggestions such as shortening the length of a film or abstracting an important five minutes out of a twenty-minute film. The existence of a technical services staff of this type would alleviate many previously unspoken complaints and, in turn, decrease faculty resistance to instructional materials.

Acceptance of Instructional Materials

Secondary Education

If the teacher is threatened or put into a secondary position by the use of the media, two things may result: (1) the teacher may avoid its use whenever possible; or (2) when the media are used, they won't be used properly. To alleviate this situation the use of media must indicate the versatility of the classroom teacher rather than convey a factor of dependence upon a more competent teacher. Methods of introducing new technologies have been shown to be effective in changing receptivity to them. For instance, the teacher could be shown on videotape to introduce a series of instructional television programs. Also, at certain points on the tape or film the media instructor could pause and turn the presentation of an idea or illustration of a method over to the classroom teacher; this would protect the teacher's status and self-esteem. At the conclusion of every film, certain operations should be required of the classroom teacher; he might show related filmstrips or lead a group discussion. In some manner the teacher must become committed to making the use of instructional materials successful in order to avoid the negative features that follow when the media are considered to be intruders in the teacher-student interaction.

A completely different viewpoint from that presented above is that the best way to avoid preempting the teacher's position is to keep the screen free from the image of another instructor, that is, to present information in an organized form and directly rather than to present it through a commentator on the screen. For example, a film of a scientific event can be accompanied by an unidentified voice or no voice. Accordingly, the manipulation of anonymity might create a place and need for the classroom teacher.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production

Production Team

To improve the quality of instructional materials, the production team should include people from several areas other than that directly pertinent to the area under consideration; for example, in the production of an instructional film on mathematics, the advice of engineers, physicists, and psychologists should be sought. In addition, the program should be viewed in advance by nontechnical people selected from the population for which the program is designed. Their advice can often be quite helpful.

Production Centers

Financing

Funds are needed to provide means for quality control research. If money is not spent to develop quality, the time and energy of thousands who receive and try to use the media will be wasted.

LIBRARY FUNCTIONS

Utilization of Resources

A serious lapse in the distribution system results in the unavailability of many good quality films donated by the moving picture industry for educational purposes. Hundreds of films remain in the warehouses of Teaching Films Custodians in New York due to the lack of resources for editing, abstracting, and indexing them. The need for this type of financial support must be translated into a demand and then into useful materials.

National System for Depositing and Retrieving Instructional Library Material

The Regional Educational Laboratories were designed to function as centers for films and other instructional materials which would be available to improve the schools. In this manner the Regional Laboratories could influence instruction both locally and nationally; however, only the Laboratory in the Carolinas and Virginia has emphasized in plans the possibility for establishing a procedure for the production, testing, and distribution of instructional materials. When the program was financed, however, all funds were eliminated except those for the higher education program. Therefore, none of the Regional Laboratories have a strong program for stimulating uses of the media. For this purpose, it would be most desirable to establish a national network of instructional materials production centers in neutral territory, unassociated with a university or a particular school system.

Distribution and Classification

The classification of information in order to obtain efficient retrieval is a very serious problem; the Handbuch de Physique has no counterpart in this country. A systematic organized team approach will be necessary to abstract a dictionary of concepts for every instructional field. Care must be exercised in the development of information retrieval systems which, if not controlled and made efficient, may themselves contribute to the overwhelming mass of information already available without helping to categorize it and make it really accessible. The situation would also be improved if libraries would develop a selective system of ordering from publishing houses instead of blanket ordering.

Transmission or Distribution to Places and Points of Use

Prompt distribution of media to the places of use is extremely important since quality is truncated when they are not readily available. When films are used extensively, they should be stored in the departments rather than in central libraries. There is a continuum of accessibility: some films could be available immediately by microwave or cable systems connected to information centers; within ten minutes, as from a departmental library; and from three to twenty-four hours, if flown in from all parts of the United States. Any requirement of advance notice greater than twenty-four hours subtracts from quality. Efforts must also be made to control the ordering of film series to avoid situations in which the last of a series is available but not the first. Use of the media in a laboratory which students may attend at their convenience alleviates many problems.

CONDITIONS OF USE

Examples

Medical Profession

In the medical profession much information is disseminated by radio and by tapes that may be used by physicians in their cars as they travel from one place to another. Many receive stacks of stereo disc-tapes for this purpose. Smith, Klein, and French Medical Training Operation utilizes every possible medium that can be employed at the physician's convenience. New methods of surgery are displayed on a small screen with slides synchronized with a taped lecture. Along a similar line the Society of Clinical Pathologists has a division which produces an audio-visual kit every month to train pathologists in a current bit of information. The correspondence courses from the University of California Medical School, San Francisco, make extensive use of the media. The medical profession is approximately five years ahead of general academic areas in its use of instructional materials, partially because it has generous financing for the construction of special production facilities.

Museums

The fact that mechanical media can be stored and activated at the viewer's convenience is an overriding benefit of educational technology. Two leading examples of institutions which are equipped to operate at the visitor's convenience are the Museum of Performing Arts of the Lincoln Center and the Museum of Science and Industry in Chicago. It is encouraging that in two years instructional cartridges may be available which may be used in private television sets.

CONDITIONS OF USE

Time

In order to reach many of the disadvantaged groups of people, it may be valuable to persuade broadcast networks to produce programs for them in prime viewing hours. In many areas the viewing of horror movies from 11 p.m. to 1 a.m. is very high. If a movie ends at a quarter to one, something of real value could be quickly transmitted. In Chicago on WGM, the independent Marshall Field station, one movie ends at 11, the next begins at 11:30, and in between are announcements of available jobs and training courses. These bulletins are produced in the filming studios of the local educational television station and may properly be considered to have an instructional value and immediate use.

Context of Use--Learning Environments

Instructional television works under a handicap that has been fostered by commercial television; that is, persons are able to turn off the latter if it doesn't interest them. The concept of an obligation to continue watching implies a radical shift in attitude since often even in the use of instructional television, conditions are such that it can be turned off at will.

The Harvey White physics course,* which The Pennsylvania State University purchased with a grant of $14,000 from The Fund for the Advancement of Education, defined this problem when only three people registered for credit. Similarly, courses in sociology broadcast by WFBG, Altoona, had 35,000 people viewing them regularly. According to a carefully conducted telephone survey, however, only five or six people officially registered for credit. This situation makes it difficult to operate instructional television courses economically since people tend to prefer paper-pencil correspondence courses. The reasons for this dichotomy appear to be twofold. First, instructional television is generally scheduled in the evening, whereas correspondence courses may be studied at the individuals' own time and convenience. This is one advantage of closed-circuit television programs in universities which can be viewed at the student's convenience. However, the second explanation may be more significant than the first; that is, people regard television as entertainment from which they must receive an emotional impact. Most people do not perceive it as a device which can be used for formal education, although education most certainly can result from effective use of the media. The attitude of the public must be changed in this respect for effective utilization of instructional television.

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*A series of 162 films in the Encyclopaedia Britannica Films Physics series by Harvey White, professor of Physics, the University of California, Berkeley.

LEARNER INTERACTION WITH PROGRAM MATERIALS

Applied Learning Principles

In general the attitude of the members of this seminar is that learning theories are interesting laboratory phenomena that have little or no relationship with reality.

EFFECTS ASSESSMENT

Ways of Measuring

Longitudinal studies in a controlled environment are needed to properly assess the effects of instructional materials upon children.

ABSTRACT

THE PENNSYLVANIA STATE UNIVERSITY

SEMINAR II ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

December 11, 1967

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DISCUSSION TOPICS: Page

SOCIAL NEEDS

- Definition 1
  - Quality 1
- University Role 1
  - Administrative Decision Making 1
- Extent and Kind 2
  - Vocational Education 2
  - Federal Legislation 2

GENERAL PURPOSES AND GOALS

- Instructional Objectives 3

REQUIREMENTS AND SPECIFICATIONS

- Resources and Economics of Education 3
- Acceptance of Media 4
  - Experimental Colleges 4
  - Elementary and Secondary Education 5
  - Federal Support 5
  - Teacher Training 6
  - Incentives to Institutions 6
- General Purposes and Objectives 8
  - Recommendations 8

DISTRIBUTION STRATEGIES

- Distribution System 8
  - Mifflin County (Pa.) System 8
- Multimedia Systems 9
- Technical Standards 10
- Future Developments 10
  - Photo Chromatic Micro Image 10

SOCIAL NEEDS

Definition

Quality

In examining the elements of quality of instructional materials from the viewpoint of their relationships to social needs, the question which first arises is this: Does quality have objective characteristics? From this starting point, referring in particular to elementary and secondary education, the assumption must be that quality does indeed have definite and definable objective characteristics. The additional premise which must be made at the outset is that the focus is on learning, not on teaching. Learning must be judged as the degree to which it succeeds in meeting the needs of the learners. How learning occurs, that is, by what instructional methods, is not important. The instructional methods are means, not ends.

Again substituting the word learning for the word teaching, the definition of quality of instructional materials broadens to encompass media as the instructional method. How, then, can media be used as the means for meeting the needs, the interests, the aspirations of learners? This is the basis for formulation of policy by those who make administrative decisions about education.

University Role

Administrative Decision Making

Use of media in the classrooms of the elementary and secondary schools is one of several instructional means open to the school administrator. There are alternative means from which to choose, and the administrator is faced with the problem of selection from among the defined alternatives the most effective instructional plan for meeting his school's or district's needs.

There are numerous factors entering into an administrator's decision, and he must make his judgments and decisions in the light of all these various factors and constraints that operate. Not only must he weigh the alternatives in the scale of how well they provide the opportunity for the students to learn so that they can develop the desired behavioral changes, but he must at the same time develop a procedure for validating the instructional method he selects.

High on the list of constraints is relative cost. Practical considerations are inescapable. The school administrator runs his school or district on a budget, and he is limited in making his choice of instructional means to what provides the best instruction for the available money.

If the alternative methods are close enough to cost to eliminate cost as a factor in his decision, the next consideration is availability.

In a practical sense, let us assume the problem of a school superintendent with a given amount of money. He can hire teacher aides, he can buy additional books for the library, he can buy special books for each classroom, he can take the children on bus trips to places of historical and cultural interest, he can provide the classrooms with viewing equipment for films and filmstrips . . . or he can use television in the classroom for some of the instruction. How does he determine which is most desirable? Here the role of psychologists is becoming very important in helping the administrator decide upon the most desirable of all the alternatives. Also, more and more the superintendent is calling upon the advice of an economist in making his decision.

As an alternative choice for instructional means, television is merely a receiver, it yields nothing as an entity, it can receive only what is sent. Television, as a distributing system, is merely a means of communication; what is transmitted, the instructional (stimulus) material itself, is the value of television to a classroom.

Extent and Kind

Vocational Education

One of the great neglected areas in the use of mass media is in the teaching of perceptual motor skills. Technology is particularly adaptable for this kind of teaching. Think what could be done in the field of vocational education in developing countries with the adequate use of technology.

Federal Legislation

Anyone who reads the language used in setting forth the purposes for which all the recent Federal education legislation was enacted cannot escape the implicit demand for innovation in the area of new educational technology. The Economic Opportunity Act, the Vocational Education Act, the Elementary and Secondary Education Act, and the Higher Education Act all set standards of potential excellence which cannot be achieved by traditional

SOCIAL NEEDS

methods. New technology will have to be an integral part of the educational systems if these standards are to be met.

GENERAL PURPOSES AND GOALS

Instructional Objectives

Most of today's educational system is not relevant, in spite of efforts being made in this direction. This irrelevancy is particularly critical in the education of the disadvantaged. There seems to be a trend in the U. S. Office of Education toward an organic curriculum, a new concept of education.

A new philosophy of education will bring about a new kind of educational system. Looking toward what direction a new kind of educational system could take shows the change probably would stem from a new approach to education. The school would continue to function but would not be the entire instructional system. It would provide the basis for youngsters to learn for the required number of hours. Here, in the school building, the conditions for learning would be provided. But the change begins here and the role of the teachers takes on a different function.

The teacher, in the future educational system, provides a variety of conditions for learning and directs the students to the instructional means best suited to meet their individual needs. Technology of the future, rather than being in competition with the teacher, should become a tool for the teacher. Technology gives students the opportunity to learn; it is an aid to the teacher, rather than a device for teaching.

REQUIREMENTS AND SPECIFICATIONS

Resources and Economics of Education

From a strictly dollars and cents approach, instruction by television is a sound investment. There are, of course, many variables, particularly those involved in the elements of quality of the instructional materials used on television. The quality can be increased in relation to the volume of use. That is, if a series of television programs can be assured a high use rate and level then the budget for designing, planning, and producing the materials can be built around the necessary cost for that kind of quality.

In a real situation, from the school administrators' viewpoint, the cost is figured on a per-pupil rate. Figuring 50¢ per pupil per year for one program-a-week works out to less than 02¢ per pupil per program per year.

REQUIREMENTS AND SPECIFICATIONS

It costs about $100. on a low bid contract to buy a television receiver for each classroom. Adding this in at the receiving rate of one program a week, the instructional cost comes out to about 15¢ per pupil per year.

However, leaving the dollars and cents approach, educational quality cannot be measured in terms of money. Unless cost savings can be related to output, the educational objectives are not being met. Here measurement effects must be applied. Are the cost savings affecting the dropout rate? Or, any other practical educational problem? The economic benefits of using television must be measured in respect to the outlined objectives. The efficiency of any system must be judged by this economic rule: Does it meet the objectives with the least cost or with a given input and does it maximize the output?

It is obviously going to be the direction of the future to provide teachers with educational technology. Speaking now from the standpoint of economics alone, the needs are going to exceed the available resources.

There will continue to be a series of educational goals, changing according to the social needs which apply, and our resources will continue to be limited. In order to find ways and means to meet these particular demands, there will have to be a shift from a labor intensive type of input to a capital intensive type of input. In educational terms the shift is then from the teacher to the technology.

In order to accomplish this shift and provide an incentive to the school teacher, it must be clearly demonstrated that educational technology provides the best cost effectiveness ratio. It must also be shown how the savings, that is, the difference in costs can be used to the advantage of the teacher and the system, perhaps through funneling this money into programs for further development and use of educational technology.

Acceptance of Media

Experimental Colleges

If educational change will only come through innovation as a result of evaluation, how can an experiment be promoted and accpeted? Ideally, a college should be established within the Universith which could experiment with ways to operate the rest of the University. One of the major components in this experimental college should be the library. The main obstacle in any of the institutional experiments along this line, such as the Capitol Campus near Harrisburg and the Hershey Medical Center of the Penn State system or Florida Atlantic University, has been to get the administration's centrally responsible planners to make rational decisions about technology.

This obstacle applies at all levels of education. Administrators are going to have to accept technology into the educational process because economic forces will drive them to accept it. The "cost effectiveness system" in education acts as a substitute for the market approach in private industry. Administrators will have to adopt a system of priorities. They must also develop criteria for evaluation of performance. This is the only way in which they will be able to use the available resources to the most effective ends.

Elementary and Secondary Education

One of the alternatives for elementary and secondary education if a system of priorities is not worked out, and a very undesirable alternative, is for the State department of public instruction to impose strict formulas for utilization of resources. There has even been a recommendation that funds would be allocated on the basis of student credits.

Speaking realistically, the problem becomes that of how to create conditions so that the use of technology can be increased.

Federal Support

At the present time about 15,000,000 public elementary and secondary school children and 500,000 college students are being taught by television. This exposure to television is on the increase, but not at a rate comparable to the need in realistic terms. There are encouraging signs, however, and one of these is the support given by the federal government. The federal government has been putting money into the equipment necessary for television use and now is beginning to think along the lines of how to spend money to improve the content quality of the television programming. Although the amount of federal support is not extensive, it has a great value above the actual dollar amount. It acts as seed money and has the effect of stimulating the growth and use of technology.

On the debit side, a fair assessment shows that today's instructional media have many and serious weaknesses and, unless there is considerable improvement, increased acceptance and use will be difficult to attain and sustain.

Another factor on the debit side is the current cry about the lack of manpower trained and effective in the use of educational technology. Since the lack is not in manpower itself but in training, funds for programs of training would solve this problem. If funds were available, there are large numbers of people interested in obtaining knowledge and skills so that they can use educational technology to teach more effectively. The training programs would have to be directed two ways: in-service for the present teachers, and preservice for the students in teacher training institutions.

In addition to training of personnel, there will have to be more distribution channels, greater effort to produce high-quality instructional materials, and more concern with the program design.

In time, acceptance will come with use and training.

Teacher Training

It is ironic that teachers who come out of the schools of education and teacher training institutions are themselves trained largely by traditional methods. They will obviously teach what they have been taught to teach in the way in which they have been taught. How can they be expected to know how to teach with a different methodology than that from which they have learned? They will use the identical techniques by which they were taught.

Over a period of time this could be changed if student-teachers were educated in institutions where technology was properly used and then were employed in school systems with the necessary equipment and other conditions, to allow them to teach the same way. This would, of course, be the ideal combination and would assume the school to have multichannel and videotaping capability and to be tied into a well designed distribution system.

Incentives to Institutions

There is increasing public resistance to the ever-growing tax burden. This resistance will have to be met and dealt with by those in decision-making positions in institutions. Administrators are going to have to find ways of better utilization of resources. For instance,

REQUIREMENTS AND SPECIFICATIONS

Penn State could be teaching at least twice the number of students than it is now teaching. The people (of Pennsylvania) are entitled to the best education for the largest number of students from their state university. The establishment has failed to make the best utilization of the faculty and is assigning the teachers with the greatest degree of training to the wrong kind of duties at excessive cost. Entering into the situation are these factors:

1. Misuse of People.

Each professor could teach many more students if methods and technologies were changed.

2. Academic Freedom.

This term has become a gimmick by which professors misuse and misinterpret the latitude intended by the concept. The whole concept needs to be reformulated. The variations need to be defined and studied. Perhaps academic freedom needs to be examined as academic responsibility.

3. Library.

Faculty rotations put greater demands on library resources. A new professor requires special books and special equipment from the library, bought especially for him. This drain could be eliminated by a library exchange of items of a special nature when a professor comes from an institution which has already provided the items for his particular needs.

4. Working Conditions.

The trend is toward shorter working hours and lighter teaching loads. This operates in spite of the increasing enrollments. A new look in this direction should be taken.

5. Curriculum.

So much of the material in the curriculum is there just because it has always been there. The subjects are being covered in the manner which has become traditional and therefore sacred. A vast amount of antiquated material is taught at the discretion of the teacher. Evaluation of the curriculum will of necessity result in change and in this change will come innovation.

REQUIREMENTS AND SPECIFICATIONS

General Purposes and Objectives

Recommendations

To promote and encourage the use of media to greater advantage to the American educational system at all levels, there should be a "National Science Foundation" of educational technology with a research branch and a grants branch.

DISTRIBUTION STRATEGIES

Distribution Systems

Since educational technology will be used more and more extensively in the educational process during the 1970's, the emphasis should fall on the kinds of distribution systems most practical for use within the entire system. The distribution network must be designed into the system and be an integral part of the whole system.

Mifflin County (Pa.) System

One example of this concept of distribution of instructional materials has been planned for Mifflin County, Pa. Three school districts were combined into one large district and all the school buildings were wired together with 2500 megacycles. Four channels were allocated: (1) WPSX retransit. This channel could play back WPSX (the in-school television station for the area) programs taped from the air and held for later or second viewing. In case of class conflicts at the original viewing time, this channel provided means for "holding" or storing programs for relatively short periods of time. (2) Distribution of videotaped materials from the air. (3) Distribution of films owned or rented. (4) Production of local material with local teachers and students.

Originally, as in most instances in the beginning of instructional television, the class marched from the classroom to the general viewing room. For the most part now in Mifflin County, each classroom has a receiver and the class views the programs there. This system with four-channel capability largely eliminates traffic and scheduling problems. It is possible in the future to look to expansion to as many as twelve to twenty channels, with a variety of lessons on call through pushing a button. Again, in the future, each school system would have a log on a daily basis, making information on the materials accessible to the teacher. A program schedule worked out for from one to six months ahead would also be provided the teacher so that he or she could plan ahead and use the television material as a component in their lesson designs. In this way instruction by television becomes a regular experience for the classroom.

In a multichannel system, the grouping should be made generally around primary, intermediate, junior and senior high school divisions rather than one channel to a grade.

Although the planning for the system for Mifflin County was completed, the installation was never accomplished because of lack of funding. It had been developed under a Title I, Elementary and Secondary Education Act, grant. When a later ruling restricted equipment expenditures under Title I to 10 percent of the total amount, this project was dropped.

Multimedia Systems

The basic questions of choosing the best instrument for "packaging" instructional materials and then of getting them most conveniently and efficiently delivered to the intended users is really not a multimedia problem. It is more accurately a multimode problem. It involves the appropriate combinations of the use of print, sound, still pictures, motion pictures, and various other kinds of modes of encoding, decoding, storing and transmitting information.

Although any new system of education must include a consideration of really new forms of library exchange, it will probably be 1990 or later before any of the new developments become realities.

New configurations of information will have to be incorporated into the development of a national system of depositing and retrieving library material. In terms of a given school, it would mean the elimination of the kind of individual school library we now know, and the creation of an instructional resources center. This center would provide for viewing of films, filmstrips, videotapes and audiotapes not only within its own facility or in adjacent classrooms by electronic communication, but also to homes, laboratories, community centers, and distant classrooms. The ramifications of this development are tied in with new technology, with the aim of having the many modes of presentation of instructional materials available on call to an electronic receiver, which could be called the home learning center. The television receiver set as it now exists will be obsolete.

DISTRIBUTION STRATEGIES

Technical Standards

Technically, television in the United States is of primitive quality. In Europe the technical standards are much higher than those in the United States. For instance, the U. S. standard number of lines is about 600, or 350 at the home set. In order to reach a higher standard, the U. S. should have developed technical quality up to 800-1,000 lines.

Future Developments

Photo Chromatic Micro Image

A very recent development by the National Cash Register Company is called the Photo Chromatic Micro Image, PCMI. Through the PCMI process the entire Bible can be reduced to the size of a 2 x 2 slide. This and other developments require the best thinking about adapting these resources to the best advantage. It is a maxim that quality of education is enhanced or truncated by financial resources. This need not be the case. With the use of PCMI, it is possible to have, for instance, the entire resources of the Harvard library available on a national network with access to any point in the United States by institutions or individuals.

Another potential use for PCMI and other media developments in this area is a solution to the problem of our culture becoming a non-reading society. Can media take their place beside the book as carriers of information? As a Nation, we don't read; we look at pictures. There is a growing trend toward an oral sound society. We demand picture sources, sound sources and sound responses.

This may be the needed educational revolution: The use of media persistently and forcefully to teach and guide vast populations in learning the appropriate skills for learning -- the instrumental skills of education.

ABSTRACT

WASHINGTON, D. C. - Joint Sponsorship with the National
Association of Educational Broadcasters

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

December 18 and 19, 1967

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December 18 and 19, 1967

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DISCUSSION TOPICS: Page

SOCIAL NEEDS

- Criteria 1
- Characteristics 1
  - Specific Uses 1

GENERAL PURPOSES AND GOALS

- Instructional Objectives 2
- Behavioral Objectives 2
- Operational Objectives 2
- Role of the Media 2
  - Characteristics of the Media 2

REQUIREMENTS AND SPECIFICATIONS

- Design Strategies 3
  - Research Development and Application 3
  - Quality and Its Measurement 4
  - General Design Strategies 5
  - Examples 7
- Acceptance of the Media 7
  - Barriers 7
  - Copyright Restrictions 8

LIBRARY FUNCTIONS

- Distribution and Classification 8
  - Dial Access 8
- Storage 9
  - Bibliographic Control 9

DISCUSSION TOPICS: (cont'd) WASHINGTON **Page**

SELECTION, TRANSFORMATION, AND PRODUCTION

Production 9
Production Techniques 9
Production Situations 10
Production Centers 11

CONDITIONS OF USE

Context of Use 11

LEARNER INTERACTION WITH PROGRAM MATERIALS

Applied Learning Principles 12

EFFECTS ASSESSMENT

Behavioral Change 12

SOCIAL NEEDS

Criteria

The validity of instructional material will ultimately be determined by the social problem which it solves.

The instructional media must attempt to satisfy a high priority social need, pursuing it through all its ramifications, before a valid baseline can be established for the quality of existing media facilities. Such a massive attack on an important problem requires, first of all, a set of clear objectives, then, a broad application of media in all its forms to the achievement of these objectives, with continual feedback from various critical points in the sequential processes (see chart).

Characteristics

The characteristics of the instructional material should be determined by the characteristics of the target audience. The characteristics of the population to be reached by the media must be considered in all formats of the material.

A good example is the NCSCP Round-About program, developed in Washington, D.C. It is directed to urban Negro preschoolers, and it builds up a repertoire of surrogate experiences through field trips. It generates creative expression in children and provides a Negro male authority figure as narrator.

Specific Uses

The problems to which the media should be applied are known, but specifically what approaches, formats and content to employ in dealing with them is not known. The correct communication media must be applied to the specific problem.

The Appalachia program tried to use the media as a subsystem instead of using it to create a new system. Traditional concepts about what education should be, prohibits the utilization of the media in school when the "image" of the teacher is transmitted regularly into the classroom of another teacher.

An important prerequisite for the eventual solution of the problems in education is that a combination of instructional media (audio-video tapes, films, etc.) be employed in an integrated system. This requires a unification of the media. It is not desirable that the financing of research in this area be fragmented among many different bills and titles, each concerned with a limited "slice" of the problem.

SOCIAL NEEDS

Before the social needs can be met, we must change the public's concept of what education should be; "ITV must be knocked into the public consciousness."

GENERAL PURPOSES AND GOALS

Instructional Objectives

Is the immediate goal to improve educational media or to utilize media in a way which will improve education? The quality of the existing media may be sufficient, while methods of utilization could stand to be improved.

In the military situation, the objective is to devise a specific course with specific instructional objectives. One instance of this design is the electronics course designed at Keysler AFB and worked on since the end of WW II, which is providing effective training for electronics technicians. What are the objectives for education?

A possible goal for education in utilizing instructional media would be to create learning skills by teaching the student things that will help him learn more.

Behavioral Objectives

Instructional materials should produce interest and motivation, which must be reinforced by ready access to additional materials needed for learning (textbooks, library facilities, etc).

Operational Objectives

A prototype should be developed that can serve as a model for production systems throughout the country.

Cybernetic System Concept. The plan of operation should not be determined too far in advance. Feedback from various levels in the program should serve to modify and improve methods of approach.

Role of the Media

Characteristics of the Media

The teacher can be viewed as a medium. In a practical appraisal of the conditions of education, the teacher must be evaluated along with the various other media according to effectiveness in performing the task of teaching.

In the military context, experiments have been carried out in which the instructor was replaced by audio-visual instruction eight hours a day. Elimination of the teacher did not appear to impair learning in this situation. Only the military has the administrative power to replace teachers, but teaching is not specifically the career of the people involved in instruction in the armed forces.

Role of the Teacher

Full utilization of the media may be most profitable when there are changes in the role of the teacher. Instructors would be replaced by "guiders" who would maintain the reinforcing quality of the student-teacher relationship but would no longer be required to lecture on basic, repetitious material.

In effect, instructional television would transmit the teacher as a medium. The "image" of the teacher could reach more students, more often, particularly in inaccessible areas (Educational Co-operative in Appalachia or the development program of El Salvador).

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

Research Development and Application in Mass Media

Most of the research on mass media has been done in "non-mass media institutions." Researchers want to control all variables. This approach is not entirely appropriate or extensive enough for the ultimate purposes of education. Its result is a number of narrow views of the problem which do not add up to significant new strategies.

Laboratory strategies in research may not always apply to school conditions, but a model system can be designed in the laboratory and converted and adapted for use in the schools. The model should deal with real problems in their context.

A well-equipped center could be established somewhere in a set of adequate buildings reflecting the "experimental theatre model." But the "experiments" should be directed to the realities of the world; otherwise, a prototype is created that can never be adequately useful.

This "experimental center" could also serve as a professional training base for skilled media practitioners, especially on the intermediate and advanced levels.

If the "experimental center" is an auxiliary of some commercial or community broadcasting system, it must retain a sufficient degree of autonomy to create new models.

Can Madison Avenue motivation research contribute to the goals of instructional television? This question should be explored.

Quality and Its Measurement

With regard to quality of instructional media, improvement may be more a function of increasing effective utilization and less a function of improving the production parts of the system. Truncation of quality results from educators not fully using the potential facilities. What must be measured first is what the existing media facilities of all necessary kinds can do when they are applied intensively over adequate time to a significant problem.

Quality can be measured by the effectiveness of the media in attaining preset goals, with reference to a favorable relationship between inputs and outputs (the efficiency of the system).

Better technological design does not necessarily mean higher quality of instructional materials. The question must be asked: Does it produce the desired effect?

Limiting Factors in the Attainment of Quality

Curriculum people must be educated in the use of their tools; must be able to throw out traditional, illogical assumptions about proper methods of education; and must, to an extent, become "media people" in order to use the materials to full advantage. Likewise, "media people" must become educators in order to understand the problems that instructional media must deal with.

Teachers usually design a curriculum by selecting from the media what they can't possibly supply themselves, (e.g. Performing Arts broadcasts in Washington, D. C. schools). This leaves the teacher with the major role in educating, a role which could be broadened and improved by a more extensive application of the media.

Media people are peripheral to the education processes as the organized "power structure" now operates. They don't take part in any of the decision making for which they are best qualified. Someone should have the authority to design an entire educational program, employing all the available media, directed toward a particular set of goals.

A training program for teachers and media practitioners should be set up. Media must become more than an instructional technology;

it must become an essential part of the curriculum. There is urgent need to introduce technological communication arts into the curriculum, with courses in the production and utilization of electronic instructional media and materials. There is a need to teach television appreciation in schools, instead of ignoring the fact that present cultural conditions have resulted in extensive exposure to the television medium. The curriculum places too much emphasis on the printed literature which has very little relevance to culture as it exists today.

General Design Strategies

Media material should be closely articulated with the entire instructional effort, which, in turn, should have a clear set of goals and objectives. All individuals involved should be aware of and sympathetic toward the objectives. A hierarchy must be established to guarantee unity of purposes. Proper utilization must be engineered (designed) before the problem of format is considered. Design should be a continuing process, changing to match the increasing sophistication of the teachers and students in working with the media.

Format Considerations

The following format considerations are important:

Attractiveness

Particularly at the start of the program, attention-getting techniques must be found.

Legibility and clarity

Symbols must carry meanings that are clear to both student and teacher, but they must not be so trite as to be boring or so complex as to be confusing. It is important to *pace* and gauge the complexity of the material to the sophistication level of the target (learner) audience. Symbol simplicity may contribute to unity of purpose.

Brevity

What is the ideal length for a film or lecture? How much time is available for accomplishing the instructional goals? Eliminate irrelevant material (credits, lead-ins, etc.) and avoid irrelevancies and interferences.

REQUIREMENTS AND SPECIFICATIONS

Repetition and Review

It may not be necessary for the student to learn the first time he is presented with the material. In other situations, the best method may be to repeat the presentation of the material in different media modes: print, audio, visual.

Authority Figure

This person should be manipulable and geared to the particular target audience under instruction.

Learner Response

Opportunity for student interaction with materials should be provided.

Approving Context

Examine the reward structure for teachers, students, administrators, and parents so that they are inclined toward providing an atmosphere of approval for presentation of the materials. The reward structure must operate toward increased quality.

Technical Quality

The production technique should not be intrusive; that is, it should not call attention to itself and away from the subject matter.

General Format

An attempt should be made to avoid the lecture format, and to organize the educational environment into a compact reality.

What mode communicates best for a given situation? Charts, print, photographs?

- Sound
  - Speech
  - Music
- Visual
  - Photographic - actual photography
  - Ideographic - representational drawing, engineering schematics, etc.

Juxtaposition of various audio and visual modes will have different effects on the audience.

When does good terminology become jargon? The "language" of the presentation should not be so erudite as to alienate the audience. This could be termed the public relations consideration of the production.

REQUIREMENTS AND SPECIFICATIONS

Examples

Hagerstown - ITV Program

This system uses electronic media in a complete, 12-year curriculum of art, music, and science, offering a demonstration of effectively meeting the ends, not just improving the means, of the educational processes. There is no pretense of being artistic; working without scripts, the teacher is placed in front of the camera and delivers the lecture. Use of student engineers, camera operators, etc. keeps production cost low.

There is no real measure of effectiveness, but it looks as good as anything else that has been done. "Face Validity" is perhaps the best description of the effects assessment.

Boston

The school system created an educational division totally dedicated to broadcasting in the instructional medium, apart from the local public broadcasting station, but using the same equipment.

Atlanta - CDC

Communicable Disease Center, National Medical Audio-Visual Center, now a part of the National Library of Medicine (See Atlanta Seminar).

Miami - Dade County Group (Don McColloch)

A complete media design group of content specialists has tried to define behavioral objectives for each area in the curriculum. Improvement and validation with regard to pre-established criteria are effected by previewing a program to one group of students, remaking and improving the program for the next group, and, in short, increasing the effectiveness of the program until a defined level of adequacy is reached.

In this mode, the media group is not peripheral to the educational system. The school system owns the production facilities, and the media practitioners handle the design of the entire system, providing films, textbooks, specific instruction to teachers on presenting the material.

Acceptance of the Media

Barriers

Teachers are often hostile toward and fearful of the electronic instructional material. There is evidence of defensiveness on their part,

REQUIREMENTS AND SPECIFICATIONS

and the illogical assumption that use of instructional media is an admission of inadequacy. This attitude is often strengthened by administrators and parents who don't believe that the media can effectively perform the functions of education. Proper utilization of the media must be made rewarding for teachers, students, and administrators.

Materials produced in one area are not used in others. A pervading sense of competition arises between production centers, subject disciplines, and institutions; and this results in failure to use extant materials. Even in the military, films produced at one base will not be used at others. Furthermore, the Air Force electronic course is probably the best technician course in existence, but it is not used in civilian training programs. Why not?

Copyright Restrictions

Plagiarism should be promoted in the utilization of relevant segments of existing material; but copyright laws must be changed before this can be accomplished.

LIBRARY FUNCTIONS

Distribution and Classification

Robert Wagner's paper on "Modular Design for a Series of Films on Communication Theory and the New Educational Media for Use in Teachers Education"* proposes that standardized bits of film be computerized and classified according to "single concepts." New films could be produced by selecting relevant footage from such a library of stock file.

Dial Access

This is being set up by the military so that remote units will have access to a centrally located facility.

Important considerations of a dial access system are these:

Ready Access,
Bibliographical Control,
Highly Efficient Classification Scheme.

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*Presented at the Conference on Cartridge Films, Michigan State University, February 22-24, 1967.

LIBRARY FUNCTIONS

Storage

Bibliographic Control

James Gibson at Library of Congress Archives is putting together a list of films with a locator for bibliographic control and ready access. This should be studied.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production

There is a lack of the following qualified people: media practitioners who specialize in the production of instructional materials, administrators who are well versed in the use of a wide variety of media types, skilled technicians who are sympathetic to the goals that have been set for the media. These people cannot be found at present.

Sufficient funding means being able to hire the best people and buy the best equipment, and having the money to buy excellent extant materials for use in the programs (e.g. Encyclopedia Brittanica strips of animation).

The production unit must be "fiscally relaxed," with no need to exploit the instructional media project for financial gain.

Time - When deadlines are set, as often happens, this forces compromises in quality. Time is needed for experimentation, development, revalidation, and revision. Adverse pressure of deadlines must be eliminated, even at the risk of depriving one generation of the benefits of high-quality materials.

Lack of experimentation and validation is a direct result of insufficient time and money. Units are transmitted without pretesting, and the only determination of validation is a subjective judgment by teachers and administrators.

Production Techniques

Use of television in place of films was originally justified by the increased speed of television production. "A film" takes almost a year to produce. Television began to imitate films and brought in script writers, supposedly to increase quality.

Mobile units still exist; they don't use scripts and the instructor is put in front of the camera after one rehearsal. There is no evidence that this method is inferior in effect to the more time consuming one.

SELECTION, TRANSFORMATION, AND PRODUCTION

Until one is proved superior, it would be wise to use the fastest and easiest method for production of materials.

Multiple Version Concept is a new development. The same material is shot in several versions or levels with consideration for the sophistication level or particular interests of the target audiences.

The same filmstrip can be used with different sound tracks.

Production Situations

ITV as part of the school system - Can the school system operate its own production and distribution facilities as described in the Miami - Dade County system? This would solve the present problem of having the media people being peripheral and ineffective to the educational processes. It would make it easier for the media to play a central role in curriculum and course development, which they must eventually do in the educational system.

ITV as a separate entity, apart from public broadcasting stations, but employing the same equipment and facilities - Boston provides an example of a community station with the type of administrative configuration that allows ITV a certain degree of autonomy while benefiting from the use of public broadcasting facilities.

ITV as a division of public broadcasting - This system would probably result in diluting the effects of ITV since the objectives of ITV and Public Broadcasting Laboratory are not the same.

ITV as a separate institution outside of the state school system - This system would possibly result in setting up competing curriculum between ITV and the state school system.

ITV as an independent task unit - School systems could provide specifications for educational materials to existing production facilities which are equipped to handle multiple priorities such as WETA, Washington, D. C. There is the possibility that present production centers could spin off special task units, but these would have to be free from the deadline pressures which impair attempts to improve quality.

ITV should be a tool of education, not a separate institution, in competition with the school system.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production Centers

Location of Production Facilities

Regional production centers where core of courses can be produced in pieces and parts, such as Southern Regional Education Board. The Southern Region Plan should be observed as a paper model.

Regional production centers could be set up without too much danger of competition replacing cooperation.

Regional production centers would provide central control for specialized production task modules.

Network of Modular Production Facilities

Independent modules of production facilities located in the context of the subject field (biology films produced in the biology lab) could operate quite efficiently by attracting media people with a heavy academic background in a particular field. In this way, films would be produced by people who have some knowledge of the subject matter in a naturalistic setting for research.

CONDITIONS OF USE

Context of Use - Learning Environments

Instructional material must take into account that a total environment is being designed. Media should be directed toward producing a compact or integrated reality.

Research should direct itself toward determining what environmental factors are conducive to learning and what are the consistent patterns where learning is thought to be occurring.

Media is the total environment. Everything that is affecting the learner or child in the environment of education, both at home and in school, should be approached by the media.

Questions of group size, architectural space design, presence or absence of teacher; all these must be evaluated systematically as to their effect on the learning process. No medium stands on its own.

We can change the environment or accept reality and compensate. It is better to complement reality than to compromise with it.

Media people need the freedom to design a complete classroom environment, but they do not have the necessary administrative power to effect changes in environmental conditions.

LEARNER INTERACTION WITH PROGRAM MATERIALS

Applied Learning Principles

Very little is known about the learning process itself. What knowledge does exist has not been sufficiently formalized for practical application.

Research may reveal that active participation and knowledge of results improve learning, but the curriculum people do not know where to introduce these factors in their program.

A better understanding of how people learn must be arrived at. This can be best accomplished by producing materials, trying them out on specific populations, evaluating their effects, and then modifying and redoing the production.

EFFECTS ASSESSMENT

Behavioral Change

Behavioral indicators could be set up to demarcate levels of quality attainment. Such validating points would serve as feedback to the system as a whole.

Attitudes of students and teachers toward the media material can be recorded.

Dilemma of the "improved course" illustrates the need for media application to the entire curriculum before effects can be evaluated. The demand system does not operate in a course-compartmentalized way. The student will reduce his efforts in the single improved course and channel them into other courses. The effects of the improvement do not make themselves (expand) evident in the single "improved course."

ABSTRACT

THE PENNSYLVANIA STATE UNIVERSITY

SEMINAR III ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

January 8, 1968

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THE PENNSYLVANIA STATE UNIVERSITY
SEMINAR III ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
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DISCUSSION TOPICS: Page

GENERAL PURPOSES AND GOALS

Role of the Media 1
    Characteristics of the Media 1
    Television 1

REQUIREMENTS AND SPECIFICATIONS

Design Strategies 2
    Research Development and Application in Mass Media . . . 2
    General 2
Economics of Education 3
Specific Operational Instructional Objectives 3

SELECTION, TRANSFORMATION, AND PRODUCTION

Production 4
    Production Situations 4
    Production Techniques 4
    Production Team 5
    Production Centers 5
    Production Costs 6

LIBRARY FUNCTIONS

Materials Acquisition 6
Systems for Depositing and Retrieving 6

DISTRIBUTION STRATEGIES

Systems 7

DISCUSSION TOPICS (cont'd) PENN STATE III

Page

CONDITIONS OF USE

Teacher Involvement 7
Time 7
Context of Use -- Learning Environments 7

EFFECTS ASSESSMENT

Ways of Measuring 8
    Pretesting in Production Stage 8
Nonmeasurable Effects 9
Testing Organizations 9
Testing Theory 9

CYBERNETIC SYSTEMS

Information Feedback 10

GENERAL PURPOSES AND GOALS

Role of the Media

Characteristics of the Media

All too often media in education are considered from an all-inclusive approach. The needs of specific age groups and subject areas are not given individual attention. If learning were traced on a continuum from elementary grades through graduate study, the optimum times for media instruction would follow different lines for different combinations of conditions. Certain parts of fields lend themselves to television learning, where others do not. For example, the social sciences require a high level of individual student-teacher face-to-face interaction at the elementary level, decreasing through the high school and college years, and again increasing on the graduate level when specialized knowledge is gained. In the art curriculum the level of face-to-face student-teacher interaction is likewise high during the elementary years, less important during high school, rising again in college, but almost completely absent during graduate work when the individuals' creative ability must take over. Media planning and production people must consider the types of learning required in specific subject areas and age groups if programs are to have great effectiveness at any given point of intellectual development.

Another factor that must be considered by media planners and designers is the attention span of the learner at different age levels. In the primary grades a 15-minute program might be the most desirable length, while in high school a 45-minute program might be assimilated with little loss of attention.

Television

Instructional media programs should serve the functions that the individual instructor cannot do or does not wish to do. For example, the camera can follow an artist in his studio as he creates a work of art or it can capture a great mathematician teaching a highly structured formula. Thus the classroom teacher can become free to provide individual instruction adapted to individual differences.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

Research Development and Application in Mass Media

There needs to be developed a number of different modes to mediate instruction of whole subject areas or of only certain segments of the subject. The philosophy should be that of the artist, who creates, discards, creates, discards until he is satisfied with his work. It must be stressed that transforming material for media takes time and experimentation. It may be necessary to fail a few times in order to succeed.

In producing films for different audiences, it is possible to make multitrack sound versions at different levels of difficulty but using the same photography. The concept of multitrack audio and the idea of multiversions of films made from the same shooting in a preplanned way has great possibilities. These combinations could use, for example, different music as a background depending upon the levels of sophistication of the target audience. They could be used in either slow motion, regular speed, or stop action depending on the technique that proves to be most effective for each particular audience.

General

Uses of Multimedia

Presently instructional television series are locked into the 30-minute program formats instead of being produced as an instructional package of varied lengths. There should be no standard limitations of time; enough time in the unit to teach the idea or skill should be the determinant.

There is a theory of production that can be called the core-of-course theory; it was developed when the Air Force asked Penn State to produce a chemistry and psychology series, each having 42 hours of programing. PSU proposed a more limited production: Only those portions of the fields of chemistry and psychology that were suitable for presentation in film were recorded. The other parts were to be learned either through texts, lectures, or laboratory sessions at the discretion of the individual teacher and the students. Time was left for the teacher to order the sequence and the nonprogramed material as he wanted.

Two concepts can be drawn from this experiment. No course should be taught on one carrier or medium. The camera should not focus mainly on the master teacher ("the talking-face technique"), but effective visual aids to learning should be on camera either over the voice of the commentator teacher or the track left silent for the local teacher's commentary. There are some exceptions to this last rule: A history course, The American Government, with a series of lectures on The Presidency, with Charles Edwin Odegaard, president of the University of Washington, as narrator was produced for the Continental Classroom. Mr. Odegaard knew personally many of the Presidents. In this case, the personality of the teacher and his intimate revelations were invaluable and most effective.

In commercial television advertising, the segment concept is very successful. Instructional television should take a lesson from patterns of advertising clips for some kinds of instruction.

Economics of Education

Quality in production cannot be attained unless the design of instruction and equipment of production centers and necessary control of financing make quality possible. Interinstitutional cooperation may bring about the degree of quality set forth in the goals if the logistical problems of centers and their financing can be worked out and the utility levels increased.

Specific Operational Instructional Objectives

Revitalizing and updating programs should be a clear part of specific operational plans. This important element in the instructional sequence should not be assumed to be the responsibility alone of production personnel.

Teachers get tired of using the same material year after year. If something new and exciting is not available, teachers stop using television and films. Introduction of novelty and elimination of decay factors must be planned for in advance. A look at the packaging industry or almost any commercial venture will show an example of the practice of constantly updating and changing for novelty.

Administrators who make decisions about the amount of time alloted to professors for instructional programing assume that they need the same amount of time to develop a program as they do to teach a class face-to-face. This, of course, is not the case. A production takes much longer because of the taping and retaping, the production of graphics, slides, and other visual aids, and the tremendous job of coordinating all of the

REQUIREMENTS AND SPECIFICATIONS

activities that must take place among the members of a production staff. One professor should not be assigned to the production staff. A number of specialists should work on a program, each contributing his own specialized knowledge. This group effort should eliminate the "master teacher concept," which threatens the classroom teachers with displacement.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production

Production Situations

The question was raised as to why New York had better educational and instructional television than Penn State and other rural universities. The answer is found in the geography, people,and economics of the two areas. New York producers have access to facilities of the kind necessary for quality, and the people who are newsmakers can appear in person as guests. However, any local production unit can, with the money to do so, move a crew to an urban area to shoot its productions. Expectations are rising for instructional television since the addition of color and the survival and revival of educational television.

Production Techniques

Designing instructional materials with preplanned and praiseworthy goals is one of the obvious quality factors, but in the production stage there are some specific elements also that should be considered. Arousing and maintaining interest is a prime characteristic of a good production. One means of attracting the attention of the audience is through the use of variety. Facial close-ups should not be used continuously. Changing camera shots can maintain interest. A study* by John Shepherd at Oregon revealed that commercial television programs had 4.9 camera changes in one minute while instructional television had only 2.1. The conclusion can be drawn that commercial television is more dynamic and fluid.

Humor and dramatic portrayal are other means of stimulating interest, but in the present-day situation in instructional television these effects are difficult to produce without professional humorists and actors.

*The Oregon Educational Television Project, 1959-1963. Educational Television Project, Final Report by John R. Shepherd, Oregon University, Eugene, Institute for Community Studies. 82 p.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production Team

A production team should be composed of the following people: writers, instructional theorists, psychologists, directors, a teacher team to determine content, on-camera teachers, computer programers, and testing specialists. Subjects should be available for testing the instructional materials. These team members should constitute the minimum number to function as a production unit.

Production Centers

Design Characteristics of Centers

If production centers are established where these teams of especially trained persons can get the kind of materials they need in the way of graphics, slides, films, transparencies, and other aids, and can in addition, spend whatever amount of time they need, quality productions will more surely result.

This concept is going to involve a very different base of operations from the places where instructional television programing is now done. One of the first functions such a center could serve would be to provide the setting for the team to let ideas about production flow. The best ideas will be chosen after testing. Testing rooms are necessary components of these centers, and students must be available for testing. Perhaps in these centers, individuals' time could be freed from university control. Private industries may join with educational institutions to build cooperative media production centers. These cooperating agencies may become the producers of the best instructional material because of the amounts and varieties of resources they have available.

Financing

Financing of productions, an important aspect of the quality problem, should be controlled by the center. Quality will suffer if people have to be borrowed from state departments of education or from universities. The leading institutions or departments play a large part in the determination of the final product through control of the requirements necessary for production of high quality. Production will reach its highest degree of quality when an interested project comptroller who has knowledge of the subject matter and media proficiency is in charge.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production Costs

The cost of a lesson series of instructional television programs depends, to a great degree, on the series' aims and scope of the material included. The goal should be top-quality instructional programs, and production costs for these kinds of programs must be set down. Presently, the cost for an instructional series ranges wildly from $5,000 upward to $7,000,000. A reasonable range in which quality productions can be created should be established on the basis of records of costs and the proved results. Then and only then can realistic demands be made for sufficient funding from sponsoring agencies. Detailed studies need to be made of the economics of instructional materials production.

Some of the productions now in process which are estimated to be "low budget" are being produced in situations where the time of the teachers and the production team has not been included in the costs; the same is true for the graphics, art work, and other visuals. This cost estimate is incorrect since salaries and materials are valid budget items. Costs of a systems approach for national use and those for local productions should have a similar basis for accounting procedures.

LIBRARY FUNCTIONS

Materials Acquisition

Centrally located facilities are needed which continuously gather information on available instructional media materials. This information should be made available at no cost to universities that wish to use the service. This information center should aid in the dissemination of the instructional material. The cost of using the materials from such facilities would have to be added to university budgets as an annual expense.

Systems for Depositing and Retrieving Instructional Library Materials

If instructional material could be packaged and stored in small segments on a "concept film" basis and a complete catalogue was available to choose from, selection and sequencing would be made at the option of the individual teacher. Use of the new media might thereby be made more attractive.

Perhaps computers could be used to sort and store catalogue information. Then the regional distribution centers could tie into the computers to make this information and material readily accessible to school systems. Professional association ratings of the catalogued material might aid the teacher in selecting from among the best available.

DISTRIBUTION STRATEGIES

Systems

Instructional resource banks should be set up across the country to give schools and television stations easy access to films, tapes, graphics, and videotape recordings that are usually difficult to acquire on limited budgets. If these centers could be responsible for copyright fees, a great problem would be eliminated for small schools and television stations.

CONDITIONS OF USE

Teacher Involvement

If teachers are to be encouraged to use instructional programs, their role in the classroom must be carefully redirected or redefined. Teachers should be assured that no attempt is being made to replace them. An open flexible system should be created in which the teacher can arrange segments of instructional material into unique patterns. If a teacher feels that he is forced to teach by media alone, he might decide not to use media at all. Tests developed for content knowledge learned via instructional media should be constructed in ways to encourage the individual teacher to select questions appropriate to emphasize the material he has given in his class discussions.

Time

Broadcasting a series of instructional programs may force a schedule on a school system. Program repetition at a number of different times might be a solution to this problem. Ideally, however, programs should be flexible enough so that they can be used as entities in themselves. If they can be used in different ways, at different times, a fixed plan will not have to be followed, and vital information will not be lost because one section of a series was missed.

Context of Use -- Learning Environments

There is the possibility of making films which contain multitrack sound to teach the same or varied concepts. Audience sex, age, educational background, and cultural differences should influence the combination of tracks to be used. One visual track could use a very simple audio for children and a more complex one for adults. Sound tracks could be directed toward specific ethnic groups or toward sophisticated multiracial city or university groups.

EFFECTS ASSESSMENT

Ways of Measuring

Pretesting in Production Stage

Evaluation must take place before a product is distributed for use. The time, effort, and money invested are too great to risk a poor final product. One way of simplifying this process is to produce short sequences that provide the instruction in small manageable parts or cohesive units. This method would allow for the continuous testing, revising, and adjusting of single parts while the progress of the whole instructional program continues. There is a need for continuous feedback throughout the sequential development of a course. Final evaluation should consider the total effect on a mass audience and, at the same time, provide feedback to identify which parts of the whole program are weak and need to be revised.

The evaluation must not be made in the light of preplanned specifications alone, for only if the program fills a real social need can it be said to be truly effective. Evaluation must not be limited to those changes that have been desired and planned for, but also must take into account changes that may take place which are unexpected. The unexpected may be desirable or undesirable. The medical profession performs this sort of evaluation. A medicine is prescribed for an ailment, but a number of symptoms that have nothing to do with the specific disease are watched for to determine the occurrence of bad side effects. The same caution should be taken with education. Care should be taken that fulfillment of preplanned specifications is not taking place at the sacrifice of perhaps more important goals. At the same time, side effects that are not planned for may take place in a program and may sometimes even improve it. If this possibility is not considered, these effects may be ignored and the program considered a weak one. Sometimes more may be learned about learning from nonplanned events than from planned ones.

Beyond the step by step evaluation of programs, staffs of instructional television stations and of future production centers must meet together to evaluate programs that are in use during a year. The Eastern Educational Network does this now. It meets once a year for the purpose of selecting the best quality programs for wider exposure and for determining the subjects for study as prospective models for future programs.

Nonmeasurable Effects

It must be recognized that there are some types of educational effects which teachers would like to think they can teach but which cannot be measured statistically or quantitatively evaluated. The creative arts, painting and poetry, for instance, need an intangible ingredient, but a very necessary one. Certain methods and techniques can be checked objectively, but the creation of a work of art cannot be similarly examined. Media can be a great aid, however, in setting the proper conditions to bring about an atmosphere in which creativity can flourish.

Let it be realized also that the media can also be used to construct new forms of tests. Films and television can mediate new configurations of sampling performances and perceptual-motor skills.

Testing Organizations

An organization which would provide continuity in programing and standardization of quality for instructional programs should be developed for the media. This organization could be patterned after the Educational Testing Service at Princeton. Professional associations such as the American Psychological Association, Modern Language Association, or the American Historical Society could evaluate course development and gain both educational and financial benefits.

Testing Theory

In order to improve the quality of any instructional material, good testing theory must be developed and relied upon. This must be a part of the overall design because materials development and theory are interrelated. Present theory must be followed (and this is not the case now to the degree it should be) in the design stages of producing instructional materials and new theories, which can be tested when the programs are in use, employed at the same time. New theory and better quality can only be developed through production and use. Using the course unit or learning segment approach will facilitate such development.

EFFECTS ASSESSMENT

If mediated instruction is to be accepted as a quality component in education, it must offer a quality "product." In order to do this, more time, money, and materials are needed by the education and production specialists who make the final product. Administrators must listen to the problems of the production personnel who are being forced to increase the level of their demands and insist upon greater support. Instructional programs should not be attempted unless such conditions are met.

CYBERNETIC SYSTEMS

Information Feedback

Detecting and measuring audience responses have always been a serious problem in the field of instruction. Systems should be utilized whereby almost immediate feedback is obtained from the broadcast audience by using the sideband frequencies of broadcasts, or questions that are recorded electronically in the home and telephoned or mailed to the originating centers. Computers can be used to handle telephone conference arrangements and to direct branching operations.

ABSTRACT

ATLANTA, GEORGIA - Joint Sponsorship with the Southern
Regional Education Board

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

February 8 and 9, 1968

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February 8 and 9, 1968

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DISCUSSION TOPICS: Page

SOCIAL NEEDS

Logistical Support of Instructional Systems 1
Extent and Kind 2
    Adult Education 2

GENERAL PURPOSES AND GOALS

Instructional Objectives 5
    Synthesis of Research and Experience 5
Role of the Media 7
    Classification 7
    Criteria for Use 8
    Television 8
Federal Programs 9

REQUIREMENTS AND SPECIFICATIONS

Design Strategies 10
    Definition of Quality 10
    Examples 10
Specific Operational Instructional Objectives 11
    Systems Approach 11
Acceptance of the Media 12
    Medical Education 12
Personnel Training Programs 13

DISCUSSION TOPICS (cont'd)

Page

SELECTION, TRANSFORMATION AND PRODUCTION
  Production 14
    Production Costs 14

SOCIAL NEEDS

Logistical Support of Instructional Systems

Broadcast operates far beyond the confines of the realm of broadcasting. There are many factors involved which must be understood when broadcast is taken out of the operational context. Broadcasting or an information delivery system must be placed in its proper relationship to the entire instructional system and its logistical support. This relationship is a prior consideration to any other; it even precedes educational research and development. There is very little real understanding of the organizational pattern of the American school and the kinds and amounts of support which are needed for its maintenance. Before any advancement can be made, all people who plan for education -- the members of school boards, the state legislators, the faculty of the schools of education, the school administrators, the interested laymen -- will have to examine the various configurations of the educational system from the point of view of providing the necessary resources in two areas: systems development to create quality instructional materials and utilization to derive the maximum benefit from these materials.

It would be a mistake to concentrate attention on the problems of higher education, the focus should be on the elementary school. This is where the students are. This is where the concentration of effort should be. As far as introducing innovations into education, the universities are lagging. The university can be, and should be, the generating point from which new and tested educational innovations are worked into the elementary school. The teacher training institutions should be the leaders in performing this function.

What the broadcaster does as manager or director of a television station or a learning resources center is conditioned by the organizational pattern. What needs to be done to improve the system and provide a broader and stronger support for it is to encourage the articulation of it in the public schools up through all different levels. The system is conditioned by trends in pedagogy, and it will eventually have to conform. It will have to catch up before it can enter the mainstream of activity. The main business of the broadcaster is not to send out miscellaneous programs. It is to apply the best communications techniques to the educational system. This should mean communications in the context of individualized instruction, retrieval systems, computer assisted (regulated) instruction, equipment uses in study carrels, and other new developments. It should mean working with teachers who are not familiar with the instructional opportunities available to them _by using the new media_. There is no leadership within the system in this area of _helping the classroom teacher_;* the training comes from outside sources. Last year in the state of Georgia the staff of the Georgia Educational Television Network conducted workshops in all branches of the state universities.

Extent and Kind

Adult Education

An illustration of a problem in adult education which shows the relationship between social needs and a practical training program, is the case of a unit of instruction which has been developed to train local government fiscal officers and local community officials whose duties are involved with fiscal operation. This course was organized by the program development staff at the Georgia Center for Continuing Education who toured the state and set up regional meetings with representatives of local community government. The purpose was to find out what were the big problems facing these communities and which of these probelms were amenable to some kind of solution by educational means. Out of these discussions came a pinpointing of fiscal skills needed by local government officials.

In designing a curriculum to meet these specified needs, the staff selected certain faculty members who had the kinds of backgrounds necessary to develop this program. The faculty members then met with representatives of the Association of County Commissioners and other leaders in civic planning. The Center fiscal management people were enthusiastic and pleased to have the opportunity to help in the development of this program. They were thinking of the most sophisticated knowledge in the field to include in the development of the course, but when they talked with the civic group, they found that, although this kind of knowledge is needed, basically the big problem is at a much more elementary level.

*See U. S. Office of Education Advisory Committee on Media recommendations of May 10, 1968 on providing materials and services at the "building levels."

SOCIAL NEEDS

The people in the group who actually run local governments and know the problems first hand, emphasized the severity of the need for training by making factual reports of town treasurers who kept their towns' books in a Blue Horse notebook in their hip pockets.

In looking for existing materials that would meet the needs in Georgia, nothing suitable could be found; the only available materials were prepared to meet academic needs. The new course had to include Georgia law, local governmental structure, local ordinance requirements, and many other kinds of information specific to this situation. The Center staff put together a small team to design a course in which the only media used, and the teacher is referred to as one of the media in this context, were the teacher; the syllabus; and written materials, such as diagrams and charts which could be reduced to an 8½ x 11 page.

This course is now being taught over the entire state. The enthusiasm from all areas of the state is tremendous. Everybody wants it. It is impossible to conduct this course at all the points where it has been requested. There just isn't the faculty to go to all these places and teach. It is necessary now to devise some scheme of priority to provide the course where the pressures are greatest. Slowly, with this very limited beginning, the Center staff will gradually work out ways of expanding the program. That is, the staff will be sending some of its teachers out to recruit teachers from colleges in a communal region with an understanding of the area and the kind of background needed to teach this course. The recruits can take the syllabus and can teach on their own with it.

Getting that simple syllabus prepared was a very difficult assignment. Funds are available or can be made available only to pay a teacher, not to pay the cost of planning. Planning has to be done by curriculum planners in consultation with subject matter specialists and media specialists. Funding under Title I of the Higher Education Act, is set up so that the only way to get the planning done was to hire these planners as instructors. What is presumed by this restriction on planning funds is that, by some sort of magic, a subject matter specialist knows how to adapt his teaching for any and all audiences. Funds are needed for special problems in planning and for bringing these kinds of teams together.

SOCIAL NEEDS

There is another important consideration. Other people all over the United States are doing the same thing. The problem of local government fiscal training has appeared as one of the most frequent needs all over the United States. There is no classification scheme which can select the elements for a course with certain specific requirements. It is possible for planners to examine the whole finance curriculum and use the parts which serve the general needs of adult education, but this procedure does not fit individual cases of social needs. However, there are elements in the training of a local government financial officer which would be useful in programs for business people, and maybe even some of the courses would be adaptable for programs for housewives. Now if there were some sort of structure, if the instruction were categorized in terms of broad objectives, in this field of finance, there could be people assembling building-block units of a variety of configurations. It could then be arranged to find the proper elements with a computer. A print-out would put together a wide variety of the programs available from the computer descriptions. Planners could take this information and build the best courses for the housewife or the best ones for the business manager by using these building-block elements.

Once the content is in the proper order for a particular course, the next step is to decide what kinds of material is best learned with programed instruction, where is it best to use television, or where audiotape is the most effective. Actually, it may not be a case of either/or; it may be a mix of modes within the one course. The enormous planning and development job carried out for local government fiscal training needs to result in a high degree of flexibility.

It is possible to categorize a course in adult education. Even though a classification scheme that is ultimately possible may not be the best developed, those working together in program planning will have to agree on some method of classification of audiences and educational objectives.

What needs to be done with this course for local government fiscal officers is to have it available to send out in multi-media forms, but, for the present, the teachers are going out to the communities with their syllabi and their charts to do the job. After testing of the course as it stands now is finished, the planners will arrange to have the revised material "packaged" in many different forms and will make an effort to get the versions out to all of the people in the nation who are desirous and in need of this information and training.

GENERAL PURPOSES AND GOALS

Instructional Objectives

Synthesis of Research and Experience

After nearly two decades of using television and related media for instruction, do we not now have sufficient experience to derive and enunciate a body of theory, synthesizing the findings of research and the empirical conclusions of producers and users?

This does not mean to suggest a definitive work to freeze approaches and expectations. Rather it means a pulling together of what is known, an analysis of why it is judged to be known, and an indication of what still needs to be found out.

Much theory is now promulgated but unrecognized as such, is passed along informally by word of mouth from practitioner to practitioner, and is fragmented rather than understood in relationship to the total body of media experience.

Further, what is known and communicated chiefly among colleagues is considerably more useful and more discriminating than what is said in public utterances, which are often platitudinous and general to the degree that meaning vanishes -- or actually misleads.

For example, in public statements it is often said that any subject can be televised. (This assertion is usually followed by some reference to "anthropology through zoology.") But everyone knows better. Experience provides a basis now for being much more selective about what and when television is used: "Whole" courses under certain conditions and for certain purposes; parts of courses under other conditions and for other purposes; often, essential but not independent components of courses. In some instances it is known that the use of television is best reserved for bringing into courses new elements that have never been there before.

The synthesis being proposed here would explain these and many other conclusions which experience and research have justified. It would not ignore conflicting conclusions but would provide the information explaining both points of view. It would look ahead to future possibilities as well as describe the present "state of the art," giving a glimpse of what media can yet do for instruction and of the conditions necessary to bring this about.

Several needs would be served by the development and availability of a synthesis of instructional media theory:

1. Training Resource

It would provide a presently lacking resource for training for various types of personnel to specialize in instructional media. Its existence would even provide a rationale for offering and expecting special training.

2. Faculty Development

Certainly a massive program of educating and assisting faculties to use instructional media is urgently needed. Portions of the synthesis would be very useful in this effort.

3. Policy Making

It would furnish a basis on which institutions, states, and regions could formulate and establish policy in the use of media in the instructional program.

4. Instructional Systems

The synthesis would provide a basis for the logistical design of instructional systems incorporating appropriate media.

5. Research Stimulus

By calling attention to the unknown and the possibilities, the synthesis would stimulate additional research that would be more programatic and less fractionated than much educational research has historically been.

6. Broadening Participation

It could serve as a guide to the selection by business and industry of useful ways to participate in the further development of instructional materials for use with media and of the media themselves.

7. Justifying Confidence and Support

Looking at the expectations generated in the media community by the study of ITV proposed under Title III of the Public Broadcasting Act, it occurs to one in moments of pessimism to wonder, "Why should the federal government do anything about instructional media? What evidence do they have that assisting media's needs would make any impact on hard-core educational problems?" The synthesis would, perhaps, show the substance and relevance of the instructional media effort, to an extent not possible in publications and public statements up to this time.

Role of the Media

Classification

It is the influence of the decision makers in the administrative hierarchy which brings changes into American education. The only real way to realize the values for effective instruction through the multimedia approach is for administrators to apply a rational system.

The thinking should bring into a logical framework the answers to the questions: Who is going to display what, when, where, to whom and with what interactions and interrelationships? The thinking should also recognize that each part of this instructional system has a special significance in certain types of situations. The principle which should operate is this: There must be the highest and best use in learning situations of audiotapes, television, radio, filmstrips, slides, and other related media, and there must be the proper ordering of these media to do the job which they do best.

The overall structuring of the instructional system has failed to do two important things: it has failed to look far enough on one hand and to look small enough on the other hand. Instead it has chosen to use the course as the focal point.

What needs to be done, instead, is to develop a structure around which judgments in the organizing of instruction can be made. Even if the course structure continues to be the major unit, there are available for use in this context a number of structural analyses, such as the Dewey Decimal System and the Library of Congress Catalog System.

Individual instructional units can be classified by these systems. Using the taxonomy of these classifications, course planners can use the single units in building the instructional sequence. The classification of the building blocks would be organized in families for multiple purposes according to age groups and instructional needs of the learners. As an illustration, in the subject area of communications the same material could be used at many different levels. If a planner was organizing a course in communications, he should be able to select from the classified material the segments he needs to use for the age and sophistication of his students. The classification would have suitable material identified as to audiotape, videotape, film, or other media for use beginning with preschool groups and graduating in the difficulty of concept to the type of material which would be used in sessions of high-level management courses for industrial executives. At certain levels, a building block unit could serve more than one specific group of learners; perhaps certain elements of a communications lesson series planned for the fifth grade would have application for first graders and could, in other instances, be used at the eighth grade level.

With the available instructional materials coded in this manner, a planner could build his course structure around a core of building blocks and add whatever he found desirable in the way of enrichment material.

Criteria for Use

Continuing the use of this kind of a classification system, which provides building blocks of instructional units, the next question becomes -- how to present the material. What are the highest and best uses for television? When is it best to use programmed instruction? When is radio, which is the most economical, as adequate for transmission of information as a more expensive mode of communication? How can a planner determine the cheapest and most flexible mode? Individually, according to specific learning situations and problems, answers to these problems must be found.

Television

In the instance of a group of students beginning the basic units in a particular field of study with major divisions as the material becomes more difficult, it is evident that television is marvelously suitable for providing much of the orientation to the general aspects of the unit by showing life in the world of the subject the students are about to undertake. A beginning chemistry student could get the feel of and a look at what it is like to be a chemist and what chemistry really is in a very real and very dramatic way from the television screen. He could be motivated by the same television presentation to consider chemistry as a field of career endeavor. However, as an example of a different approach,

3

should the instructional unit be a lesson on the history of the machine, an audiotape version of the lecture would be as effective as any other method of presentation.

In order to make decisions about how to present the instructional materials, there needs to be worked out a system of guides, classifications, and scheme families. If this could be accomplished, educational planners would rely heavily on these aids.

In a training or skill development program, television has the following uses and advantages: It provides pacing. It gives the instructor in the classroom the opportunity to identify the slow learners and to give specially needed help to them. It frees the instructor from the presentational role. It keeps the students active. In addition, television is an excellent medium for briefing new instructors.

Federal Programs

A national resource center to which specialists in many fields are supplying data on classifications and analyses would be the logical location for research in this area which, up to the present time, has never been directed to the real problems in terms of learning. This does not in any way advocate the establishment of a single national curriculum; it does instead promote the kind of structure in which a variety of programs using multimedia could be designed by teams. The programs would become the national core of materials at different levels and of a broad range of types which would be the building blocks available to administrators and course planners for shifting purposes.

A further description of the function of such a national resource center is to make a parallel with the space program. In connection with the intensive and extensive efforts which have gone into building the nation's space program since 1957, there have grown up a series of centers where people with specialized backgrounds work on specific problems, the kind of place that has come to be termed a "think tank." Why shouldn't this same kind of center be an answer to the problems of education.

A "think tank" for education would carry the weight of prestige and could be the means by which those responsible for administrative decisions would accept instructional technology and build these new developments into their institutions in the same manner as they build in electrical fixtures and plumbing connections.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

Definition of Quality

When the judgment about the quality factors of any unit of instructional material is being made, the questions should be these: Does it meet the predetermined objectives with a certain defined efficiency? Does it attract or repel the user? Does it present the information without alienating the audience? Is the content outmoded, in error, or not as good as it could be? Does the presentation lack conformity to a systematic view of the latest developments in learning methodology? Does the production achieve a degree of polish, or does the instructor stumble or the production technique reveal its own raw mechanisms?

The problems which affect quality of instructional materials are not in the production area; the problems are imbedded in the educational system. If the educational system will accept the empirical behavioral approach and look at the content of instructional materials from this approach, then the curriculum becomes more adaptive and broader in its scope. Content is the vehicle of instruction. Content includes what the student does and how he responds during the program.

Examples

Typing Course at U. S. Army Southeastern Training School

Training courses developed by the U. S. Army pertain to a specific military occupational specialty. The MOS is defined in exact terms which includes the degree of skill the student should attain at the end of the course. Television may provide a great deal of flexibility for the learner. In the typing course at the Southeastern Training School, the objective is for the learner to be able to type 12-15 words per minute. There are 20 lessons in the series; each lesson is 35 minutes in length. The average length of time for a student to acquire the desired skill is 20 hours. The lessons are available also on tape. Once students have mastered the basic typing skill, the individual learning rates become henceforth very differentiated. This is the particular advantage of television: Each student can progress through the material at his own rate. At this point, the course uses the content, not only as a means for drill and practice in developing speed and accuracy in the typing skill, but to give the student the kind of information he will need in the job for which he is being trained. He is learning about the functions of the machine he will be using, he is learning the proper procedure in handling messages, he is working with the vocabulary he will need to know in his work. This coordination between the teaching of the skill itself and the description of the duties and procedures of the job for which the student is being trained is called injecting into the subject matter collateral learning messages. While the students are proceeding through the lessons, the instructor in the classroom can readily discover the ones which need reinforcement, and he can help with their individual problems.

Specific Operational Instructional Objectives

Systems Approach

It is important to clarify just what particular set of sequences are being referred to when the concept of the systems approach is used. Systems approach is used all the way from the combination of two or more media to a very complex branch of philosophy. In order to state the manner in which the instructional material is being organized in pragmatic terms, the more definitive term would be a systematic approach of looking at what is being done.

This conceptual framework for use in producing instructional materials has casued the directors and producers to go back to the drawing boards in an attempt to analyze the sets of sequences in the production process.

When a producer examines the systems approach and begins to redesign and rethink the production sequence, he first determines or tries to predict the functional requirements that will be placed on the students who are the receivers of the information and who will make direct application of this information.

This analysis of requirements can be done more readily in some areas of instruction than in others; for instance, the film or television lesson which is designed to train the student in a specific skill can be sequenced as follows:

STEP 1. After the terminal behavior or particular degree or designation of skill accomplishment is determined, the producer then backs up to what needs to be said, done, shown practiced or encountered, in order to arrive at the predetermined degree of skill.

REQUIREMENTS AND SPECIFICATIONS

STEP 2. He then backs up from that to the means of delivering this curriculum, that is, the media and the modes.

STEP 3. He decides at this point whether to use a programed text, or a training film, or a lesson or series of lessons on television, or combinations of all of these which are best suited to the purpose. This is the first point at which the producer thinks about equipment. Now that the curriculum and the method or methods of delivery have been decided upon, the producer again backs up to take a long look at the distance that separates the student at the beginning of the lesson or course, and the desired terminal behavior.

STEP 4. This is the pretesting phase. This is the point at which the producer considers whether or not to deliver the full curriculum, whether the entire course is needed, and, if he decides that the complete course is not necessary, he now decides how to modify the curriculum to adapt to the problem of arriving at the desired goal from the students' beginning skills. This testing will show whether or not there is enough information, or more than is needed, and whether the students come into the course of instruction already having knowledge which is included in the material and which therefore ought to be eliminated.

Acceptance of the Media

Medical Education

The experience of the National Medical Audio-Visual Center at the Communicable Disease Center in Atlanta in the use of 2500 megacycle Instructional Television Fixed Service (ITFS) provides a study of acceptance for this mode of communication.

The medical profession can be termed accurately as an ultra-conservative group. In the field of teaching of medicine, the instructor has been thoroughly grounded in one way to teach. The model set up for the Center in Atlanta made the maximum use of television and became the first distribution system to interconnect 11 hospital, nursing, and veterinary teaching facilities.

An illustration of the reasons for the acceptance of television to teach medicine can be drawn from an instance of a urology professor. The professor came reluctantly before the television camera and presented his material in the same manner he had used for several years. The interconnect system at the Center allows the students to ask questions by telephone. The professor found that teaching by television could enhance and broaden his presentation in many ways:

He could see himself on the screen. He could now improve his teaching through observation of his technique and self-criticism.

He saw that the students were responding and through their questions and the discussion which these stimulated he could evaluate the material and its merits. The result was that he changed his lecture, rewriting and revising it upon the knowledge he had gained of the needs the students had, as expressed by the questions.

He saw that the closeup on the screen could magnify the details of the material he was using as a demonstration. He found additionally that students are able to retain the information more easily and are better prepared to relate it in the context of the problem.

He found he could incorporate into his lecture existing prerecorded short segments of film or videotape. This allowed him to show symptoms visually while he described them.

The experience at the Center proves that when faculty members are given assistance in presenting their material and when they become aware of the improvement in their teaching they not only relax their resistance to using television but become enthusiastic about its use.

Personnel Training Programs

In the elementary and secondary school systems, who are the people working with the classroom teachers to make the maximum use of instructional television and audio-visual aids? Where can a school administrator go to look for people to work in this area and provide this kind of service to his school district? It is a fact that there is no such thing as a utilization specialist.

There must be a training program which would develop people to administer media programs in the schools. These people would have to come out of the programs with a hybrid background. They would have to be oriented in both education and the use of media.

Although there are presently some programs aimed generally at developing the people needed for this hybrid job, the need is greater than the speed with which the programs are providing trained utilization specialists.

REQUIREMENTS AND SPECIFICATIONS

The diffusion technique used in agriculture could be a workable alternative to the present system of institutes for training media people. In agriculture, when a new grain seed or cultivation technique is being introduced, the extension service sends its county agents to the local communities for a series of demonstrations and discussions. This diffusion technique could be adapted to the school systems and could be equally as successful in education as it has proved to be in agriculture.

SELECTION, TRANSFORMATION AND PRODUCTION

Production

Production Costs

U. S. Army Southeastern Training School

The delivery cost for a half-hour program at the U. S. Army Southeastern Training School, that is, the cost of sending closed-circuit programing from its local source directly into the classroom, is about $15. There are about one hundred people on the production staff, and the average salary is about $5,000. There are 900 viewing points, where from 42 to 46 programs are shown, three shifts a day, on an around-the-clock schedule. In a year's time, this amounts to about five to seven million viewer hours. The per-course-unit cost amounts to about $5.50 per graduated student, roughly, this cost can be equated with a pair of boots! The courses vary in length from 8 weeks to 30 weeks.

The utilization of the videotape recording equipment works out to about 2/3 playback and about 1/3 recording.

There is no centralized review procedure.

Twenty-six army schools have closed-circuit television systems. Each of these facilities is responsible for producing certain materials pertaining to specified kinds of subject matter.

Georgia Television Network

The delivery cost for the nine stations comprising the Georgia Educational Television Network, that is, the operating budget after the production has been completed, is $75 per half-hour program. This is essentially the engineering and the power cost. Breaking this cost down further, it works out to about $15 per each receiving station.

The production cost runs about $3,000 per half-hour unit. This figure does not include capital expenditures but does cover maintenance.

SELECTION, TRANSFORMATION AND PRODUCTION

Ways of Saving

When the decision has to be made between using "talent" or using a regular classroom instructor, it is obviously less expensive to put the actual instructor before the camera.

When a number of programs are being produced in a series, plan for all the units as one production. If each production is treated as a new entity, the tooling-up process for each lesson or program will require its own milieu, a new "aura," and new people with different ideas and problems.

Use actual devices, where possible. Show the actual object, rather than expensive art work, photos, or film clips. Get in on the object itself with the lens, rather than using mock ups.

ABSTRACT

THE PENNSYLVANIA STATE UNIVERSITY

SEMINAR IV ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

February 12, 1968

ABSTRACT

THE PENNSYLVANIA STATE UNIVERSITY

SEMINAR IV ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

February 12, 1968

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DISCUSSION TOPICS: **Page**

GENERAL PURPOSES AND GOALS

- Instructional Objectives 1
    - Motivation of Students 1
    - Research in Educational Methods 1
    - Expressive Objectives 2
- Role of the Media 2
    - Teaching 2
    - Future Model 3

REQUIREMENTS AND SPECIFICATIONS

- Design Strategies 3
    - Quality 3
- Economics of Education 4
    - Cost Variables 4
- Acceptance of Media 5
    - Incentives to Institutions 5
    - Incentives for Instructors to Use Television 6

SELECTION, TRANSFORMATION, AND PRODUCTION

- Extant Materials 6
- Transformation 7
- Production 7
    - Production Quality 7

LIBRARY FUNCTIONS

- Learning Resources Center 7
- National System for Depositing and Retrieving 8
- Legal and Copyright Restrictions 8

CONDITIONS OF USE

- Accessibility 8

LEARNER INTERACTION WITH PROGRAMED MATERIALS

- Interest 8
- Involvement 9
- Controlled - Uncontrolled 9

GENERAL PURPOSES AND GOALS

Instructional Objectives

Motivation of Students

The specific operational objectives of an instructional television course should, in part, be to motivate students. Commercial television has proved itself to be most effective at selling products. Perhaps television should perform that function in instruction. Inspirational or attractive public figures could give impetus to student learning. Such people should not be used to teach courses but might introduce units of a course which are then taught by professional educators.

Research in Educational Methods

One of the problems that faces educators today is the selection of combinations of instructional modes which are best for teaching defined subjects. For instance, is it best to teach fifth-grade children mathematics by a combination of lecture and film, by slides in a videotaped presentation, by textbooks, or by some other combination of media? The answer is not yet known. Up to the present, the method that seemed most appropriate to the individual instructor was employed. An intensive program is necessary for testing different combinations of techniques and media. The use of item analysis on elements taught by different media would allow general conclusions to be drawn that would have application in analogous situations. Production guidelines for specific objectives must be developed if mediated instruction is to meet its full potential.

Another problem facing educators at the present time is that of the appropriateness of reinforcement of instructional material. At what time intervals should information be repeated? When should tests be given, and how frequently? Should reinforcement occur immediately at the end of an instructional unit, should it come fifteen minutes later, or should it occur the next day? The most effective schedules of reinforcement are not yet known and must be established through experimentation. Knowledge of the proper reinforcement interval is important in the overall design of any instructional system if efficiency and quality is to be achieved. At present, the videotape recorder allows instant feedback to a student in the performance of a craft or motor skill, but here again there are problems in determining how much of the process is needed to reinforce and improve a student's ability to perform that task. Experimentation is needed in this area also.

GENERAL PURPOSES AND GOALS

Expressive Objectives

One of the most imposing problems for a cybernetic system of instruction postulates its objectives on the ability to predict that the desired results is that of teaching for creativity in the arts. The creative arts have a post hoc value, that is, all of the elements which produce a work of art cannot be assembled or predicted before it is created. A work of art can only be judged as a good or a bad production after its creation. Art objects are the result of a combination of artistic techniques which can be taught objectively and imaginative expression of the student which cannot be taught objectively. The student's expression can only be judged post hoc, but conditions under which that expression will develop can be created. These conditions can be brought about by using media as a means of extending artistic awareness and sensitivity. There is a need in the creative arts for student-teacher face-to-face interaction so that the student's efforts can be judged individually and the individual given personal reinforcement. There should not be a dichotomy between the idea of teaching the arts via mediated instruction and the traditional method of face-to-face interaction. A combination of the two methods would allow more time for individual attention once a student has acquired the objectively teachable techniques and is ready for in-depth operational learning of his art under the direction of a master.

Role of the Media

Teaching

Teaching in the future by means of media will place an increasing demand on the student. The new educational technology will allow the student, in an individual learning carrel, to progress at his own rate while getting personal attention from the teacher when he is unable to continue on his own. The teacher's role will change to that of a technologist, for he will have to design curriculums for individual students. The teacher-technologist will choose from among prepackaged instructional segments that are developed by experts to perform a designed task. He will be aided by a computer that branches the student to appropriate resource materials if he cannot proceed within the established guidelines of the lesson. Envisioning these roles is difficult at present because much of the media is unfamiliar to today's teachers. Familiarity with media is a necessity for both present and future teachers, and programs for teaching teachers to teach with media must become extensive if the new system is to work.

Future Model

In the year 2000 instruction will consist mainly of individual student interaction with some kinds of mediated instruction. The teacher will only be called upon for assistance when the student cannot proceed with his computer based and designed instructional program. Two to three thousand man-hours will have gone into the preparation of each instructional program. Students will no longer attend classes in the traditional manner but will have individual study carrels in dormitories, at home, or elsewhere. Audio-visual displays will be provided by cathode ray tubes in the carrels. Lectures will be broadcast via television so that thousands will receive them at the same time. The implementation of education through media will allow teachers to direct their time and energies either to students in those curriculums that require master-apprentice interaction or to students who need remedial assistance.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

Quality

Course designs will not be effective until knowledge of the best methods of instruction for particular subjects is gained by experimentation. The following design strategy allows for the teaching of material and the testing of methods in a continuously self-improving system: At the beginning of the class, a number of learning objectives should be outlined for the students to prepare them for the videotape presentation. The material should then be presented in three forms: (1) The essential information should be given, (2) supporting and reinforcing material should be presented, and (3) material which is only tangentially related but which increases the students' awareness of the interrelationships between concepts not immediately perceived as being related. When a concept unit is completed, the videotape should be stopped and a question period should ensue. The answers can be recorded for the purposes of grading or can be used to reinforce the students' attention to the presentation. When the question period is over, the tape should resume, correct answers and, in addition, attempt to discover the possible reasons for the wrong answers. The lesson should continue in segments of this sort. A summary should conclude the lesson, and a five-minute test should then be given. This test will supply knowledge of what was and what was not learned by the students. Effectiveness of methods can then be determined. The next time the lesson is given it could be revised, and the inadequate portions presented via another instructional mode. This new mode could be tested in a manner similar to the first. The system could continue setting different modes. For instance, if a realistic film was not successful in teaching a concept, perhaps a schematic slide presentation would be appropriate. When the same type of objective is to be taught again, schematic slides could be used with confidence. Cost analyses should be added to this model to produce the most economical instruction system. For instance, in some instances color slides may not produce significantly more learning than black and white slides, which are much less expensive. However, if color slides do produce significantly more learning in specific instances, the money should be appropriated for them.

Economics of Education

Case Variables

The student-teacher or faculty ratio in instruction importantly determines costs. In some learning situations, as in the cast of art criticism for instance, a one-to-one relationship is necessary. In other situations a many-to-one relationship is called for. In these cases a public response to an idea is the educational aim. If the student-teacher ratio for specific courses could be determined accurately, teacher time could be utilized efficiently. This would save both money and manpower. Another element that should be clear as an important economic variable is that of the student-course ratio. The more students that can benefit from a course transmitted via instructional media, the less expensive per unit is the technical production cost. A course in human genetics and population produced at a cost of $5,000,000 would not be expensive if it could be used by a hundred universities. An economic taxonomy is needed to determine the best means of mediating different types of instruction in order to establish cost priorities.

REQUIREMENTS AND SPECIFICATIONS

Acceptance of Media

Incentives to Institutions

Local single school, college, or university productions are usually very limited in comparison to what could be done through cooperative interinstitutional efforts. Better use of materials and resources could be made if institutions joined together to produce quality programs; however, attaining such cooperation is not easy. A chemistry course that cost thousands of dollars was produced in color film at the University of Cincinnati, but few other institutions have even requested permission to review it. University faculty members are not anxious to be displaced or even to share their own classrooms with televised courses which set up other professors as master teachers.

One means of gaining acceptance for the new media in the academic world would be to use the best of all possible methods to produce a model course by which interested institutions could check their own production effectiveness. This strategy avoids the problem of one institution accepting another institution's course, for the model course would be stipulated as only a model.

Another possible means of attaining institutional acceptance of new media potentialities could be controlled by the appropriate professional associations. This proposal could produce many new and creative models for instructional technology. A professional association of a particular field should choose a subject for a course that could be taught in segments. These segments could be divided among established institutions each using their own professional people. A model could be developed for each segment utilizing whatever the professional groups thought appropriate to accomplish their behavioral objectives. These groups could work in isolation from one another in order that as many new ways of visualizing means of mediating instruction effectively could be developed. The final productions could be used in concert as models from which ideas could be drawn by all institutions. Such a program might lead to fruitful cooperative action on the part of institutions with similar or complementing biases.

REQUIREMENTS AND SPECIFICATIONS

Incentives for Instructors to Use Television

Teachers who are not familiar with the technical problems of teaching on television are reluctant to attempt to do so. Faculty Development Institutes* are being conducted throughout the country to correct this situation. These institutes should emphasize teacher participation in trial television and multimedia productions rather than stress theoretical considerations. Practice in the use of media will reduce anxieties about performance in an actual media teaching situation and hence increase the use of media by teachers.

Complex instructional equipment is sometimes a deterrent to the use of existing media in education. As products such as the portable videotape recorder which can be operated easily by nontechnical people and which allows for immediate presentation of recorded materials become increasingly available, teachers will find it easier to start experimenting with the uses of these media. New developments like dial access for sound tapes and film clips may also encourage the use of new media.

SELECTION, TRANSFORMATION, AND PRODUCTION

Extant Materials

Many films and television courses developed in the past contain instructional segments which might be valuable for courses being taught today. A number of years ago Continental Classroom produced a physics course on film prints which cost approximately $13,000. The course was not widely used and is no longer broadcast; however, it contains some excellent recordings of demonstrations in physics which might be excerpted and used to illustrate principles and laws of physics.

An example of an old but excellent series is the history course, The American Government, with a segment of lectures on The Presidency, with Charles Edwin Odegaard, president of the University of Washington as narrator, also produced for the Continental Classroom. Mr. Odegaard knew Presidents Coolidge, Roosevelt, Truman, and Eisenhower personally and talked about his relations with them in the first person. This series uses effectively the master teacher format. The lecturer's personal experiences are sensitively reflected in his voice, facial expressions, and mannerisms.

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*Sponsored by the U.S. Office of Education under Title VI, Part B, of the Higher Education Act of 1965.

Transformation

Thousands of commercial film prints, made available for educational uses by the motion picture industry, have been collected by an organization called Teaching Films Custodians, located in New York City. This organization has made these materials available, but the enormous job of reediting and cataloguing usable instructional films largely remains to be done.

Production

Production Quality

The proper combinations of communication modes have not as yet been experimentally determined, and such experimentation will take much time and money. While these developments are taking place, educators and media experts should combine their efforts for developing many alternative uses of media in order to select from among the best possible alternatives devised. A maximum media mix, that is, combinations of television lectures, slide presentations, computer assisted instruction, film presentations, and laboratory work should be attempted in a number of different instructional situations. However, until proved standards are fixed, allowance should be made for the possibility of error of too much use of media.

Quality could be improved by following the example of the television commercial. Commercials contain the three P's: The problem, the promise (in which a solution is proposed), and the pitch. Advertising personnel are discovering that the audiences are becoming more sophisticated and no longer need the pitch. The motivational factor, the promise of a solution, can be given without incessant rhythmic repetition. Consequently, commercials are being reduced from one minute to thirty seconds. If media specialists reduced their productions to small compact highly motivational instructional units, perhaps results would be more effective, and time would not be wasted in the constant repetition of a point.

LIBRARY FUNCTIONS

Learning Resources Center

Computer-based systems that give information on the availability and accessibility of existing instructional materials on a national basis should be developed. These systems should also furnish information on the

LIBRARY FUNCTIONS

length of time necessary to duplicate inaccessible materials. Once such systems are in operation, centers for production and duplicating will develop naturally.

National System for Depositing and Retrieving Instructional Material

Cooperative action in production is a necessity if quality is to be a feasible goal. The National Center for School and College Television has classified less than five percent of the films and videotape courses reviewed since 1960 in the excellent category. One possible reason for this is the lack of sufficient resources invested in their production. Cooperative action would supply more resources.

Legal and Copyright Restrictions

A problem facing educators today is the efficient dissemination of instructional programs once they have been developed and tested. An award-winning television series, Meaning in Art, produced by The Pennsylvania State University with Alice Schwartz as the instructor, is legally restricted for use within the confines of the State because it was produced with appropriations by the Commonwealth of Pennsylvania legislature. Similar problems exist throughout the country. The problem of copyright laws must be solved before any nationally oriented system of cooperative program development and distribution can be attempted.

CONDITIONS OF USE

Accessibility

Material accessibility will increase intensity and extensity of use. Access to videotape recordings and language tapes in dormitories should have a priority in a program to gain acceptance of instructional media. These services would allow students to view the tapes in the comfort of their rooms and leave valuable classroom space available for student-teacher group interaction. Although the initial cost of such a program would be high, it would make possible the education of more students within one facility and hence reduce the ever-growing number of classroom buildings needed on a university campus.

LEARNER INTERACTION WITH PROGRAMED MATERIALS

Interest

The formats of most existing educational television programs are unimaginative and have a dulling effect on the student. Programs making skillful use of the attention-getting techniques of commercial television could alleviate this problem. Variety in camera shots, the use of several teachers and combinations of audio-visual aids in instructional programing can increase motivation and sustain student interest.

An attempt to fit a particular course meaningfully into the scheme of the individual student's area of interest by explaining its potential value to him can also sustain interest.

Involvement

Increased involvement with new instructional materials can be obtained by teaching students how to learn from media. Perceptual training is a new development in the field of instruction, but this approach has been used for some time in photo intelligence to train military personnel to see more in a photograph than is usually perceived by the untrained eye. This approach is used in a Penn State course in anthropology in which films are used to simulate field conditions in the study of free-ranging nonhuman primates. The assumption that students see all that they are intended to see in a media production should not be assumed. One way of developing a perceptual sensitivity to media is by showing films without the sound tracts. This technique forces students to derive the intended content by purely visual means. The consequent addition of a sound track will then reinforce the student's sense of visual acuity by testing his visual conception of the content against the sound track.

Controlled - Uncontrolled

The question of how much independent interaction with instructional materials is needed by an individual student without a teacher being present has not yet been determined. Such involvement will differ for different subjects and different levels of sophistication, maturity, and intellectual development. If self-reliance is an important general educational objective, then phasing out of the one-to-one student-teacher dependent relationships wherever possible is a worthwhile goal.

ABSTRACT

BOCA RATON - Joint Sponsorship with Florida Atlantic University

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

February 22 and 23, 1968

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BOCA RATON - Joint Sponsorship with Florida Atlantic University
SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
February 22 and 23, 1968

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DISCUSSION TOPICS: Page

SOCIAL NEEDS

- Population 1
    - Florida Junior College System 1
- Federal Funding 1

REQUIREMENTS AND SPECIFICATIONS

- Design Strategies 2
    - Examples 2
- Acceptance of Media 2
    - Barriers 2
    - Incentives for Instructors 3
- Specific Goals and Objectives 3

SELECTION, TRANSFORMATION, AND PRODUCTION

- Production 4
    - Production Centers 4
    - Production Schedule 4
    - Production Quality 5

LIBRARY FUNCTIONS

- Resources 5
- Legal and Copyright Restrictions 6

DISTRIBUTION STRATEGIES

- Systems 6
    - GENESYS 6
    - University of Florida 6
    - Florida Atlantic University 6

DISCUSSION TOPICS: (cont'd) BOCA RATON **Page**

Videotape 7
    Electronic Video Recording 7
Television Broadcast 7
    Satellite Systems 7
Radio 8
Teaching Machines 8
Television 8
Computers 8

CONDITIONS OF USE

Learning Pack Theory 9

LEARNER INTERACTION WITH PROGRAM MATERIALS

Teacher-Student Relationship 9

EFFECTS ASSESSMENT

Validation 10

SOCIAL NEEDS

Population

Florida Junior College System

Ninety percent of students from high school who go on to college in Florida attend junior colleges first. The State set up the junior college system and thereby created the necessity for the majority of students to transfer in the middle of a program. This transfer problem must be met by increased cooperation between the university system and the junior colleges.

It will be necessary to standardize courses and sacrifice the autonomy of the junior college and the university. The instructional media could be effectively employed in standardized, core educational material which would serve as a foundation for future specialization in the university. There are relatively few courses that are definitely required for a foundation from which the university can operate, but it is the junior colleges' responsibility to cover adequately the material and to certify the student for future study on the basis of adequate performance in the required areas.

The university then must articulate its courses with the foundation laid down by the junior colleges.

The instructional media should be employed to their full extent as core material for required courses. It is important that the entire course is not programed, but merely the core, essential content of the course. The individual instructor can then structure his courses around this core material.

Federal Funding

The faculty at universities in Florida would like to see a federal subsidy program to the State educational system in the area of standardized high-quality instructional media. University administrators are aware that there are fewer restrictions placed on Health, Education, and Welfare funds than on money from the State. A point in fact is that the GENESYS Project* is prohibited by State law from teaching any undergraduate engineering courses, or using the facilities for this purpose.

*A graduate engineering television series produced by the College of Engineering at the University of Florida.

SOCIAL NEEDS

The universities take the position that they are operating with subminimal funds. The minimum appropriation is provided, but the disposition of funds results in subminimal budgeting for the universities.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

The design system should allow for total utilization of all the media forms, employing the best mode, or combination of modes for the particular learning task at hand.

Examples

Florida Atlantic University

This university relies heavily on the technological media. One quarter of all instruction is done over the new instructional media. Thirty full lecture courses are presented over closed-circuit television.

Television is used to produce a "candid classroom" instructional pattern, whereby a camera is focused on an actual classroom teaching situation, which is broadcast live to other classrooms and recorded for repeated uses. This use of instructional technology has freed the faculty for one full day of student consulting per week.

Miami-Dade Junior College

This college now has two campuses and is presently growing at the rate of 125 faculty members per year.

Videotape recorders are employed so that tapes can be shipped from one campus to the other without the need for either a half-million dollar (RCA estimate), 27-mile link-up by cable, or an expensive broadcasting system.

Maintenance of the equipment is handled for the faculty, who request what they need.

Acceptance of Media

Barriers to Utilization

The faculty is afraid of becoming obsolete. The media should be designed therefore to suit the professor or teacher, instead of the teacher being forced to adapt to the media.

Full utilization of the media will require a change in the role of the instructor, not an elimination of that role.

REQUIREMENTS AND SPECIFICATIONS

Professional pride in the programs being produced at local facilities could result in a reluctance to release the materials for utilization in other regions. The state or federal government will need to establish a system of royalties for producers of copyrighted materials.

Incentives for Instructors to Use the Instructional Media

A major focal point for getting the instructional media established in the educational systems is the faculty. Once faculty interest in the new technology is aroused, the strength and enthusiasm of its support will help ensure the introduction of the instructional media into the system. The faculty should be motivated to seek out what is best in the new media for solving their particular teaching problem; in this way, utilization will be increased.

Miami-Dade Junior College has approached the problem of faculty noninvolvement by establishing an innovation center in conspicuous proximity to the faculty coffee lounge. The faculty could not avoid observing, day by day, the innovations that were taking place in the field of education.

Faculty interest and efforts must be reinforced by appropriate rewards. Professors are, at present, hired and promoted on the basis of outstanding research they have completed and not on the basis of teaching skills. Therefore, developing teaching skills must be made profitable.

Professors must be able to teach their subject to a particular audience in a manner that will be useful to that target audience's career objectives. Math taught so that future engineers will have the kind of knowledge they will need in their professional development is an example.

Specific Goals and Objectives

A specific goal should be established for each learning task and the instructional material designed to reach it.

The educational problem should not be attacked on the level of entire courses. The faculty member should determine where he wants improvement, define his goals, design a project, and employ the necessary instructional media to implement his plans.

SELECTION, TRANSFORMATION, AND PRODUCTION

Production

Production Centers

Centralized production facilities are needed at state, regional, and national levels. Existing facilities of all types, public, educational, and instructional, are not capable of consistently producing high-quality materials. This is due to a lack of qualified technical personnel, inadequate production equipment, shortage of talented production personnel with the necessary imagination and creativity, and limited funds.

Instructional productions should follow the example set by commercial television, which has concentrated its production facilities in Hollywood and New York. They always have the talent on hand. Instructional media production centers must compete for that talent with comparable wages.

Florida Atlantic University has been recommended as a location for one of these central facilities. It has already established itself as a center for innovation in the field of electronic media.

The Southern Regional Education Board supervises activity in instructional development for the South, but a national board or council should also be established. This has been done in England. These national and regional centers could act as clearinghouses for material produced and could serve to keep duplication of effort at a minimum. Widespread use of the materials would justify high production costs.

There is also a case to be made for leaving production in the hands of professional companies which would turn out programs to the specifications set by faculty members. It is widely agreed that no one outside of the educational system should be handing down specifications for the materials.

Production Schedule

Miami-Dade Junior College produces instructional material on a schedule of about six to eight weeks per program. A departmental committee is formed for each program unit. A chairman is selected to direct all activities involved in producing that single instructional program.

The length of the program is determined by the content. A script is written and taken back to the department to be criticized, reworked, and restructured. This provides a curricular exercise most important for getting the faculty to discuss the subject area.

SELECTION, TRANSFORMATION, AND PRODUCTION

Producers from the professional field are brought in to assist with style. The faculty members are the actual writers.

A narrator is brought in to record the script, then the production moves to the visuals.

The visual displays are coordinated and fitted to the narration, then the process may move to the animation center.

An audiotape and visual slide presentation is prepared, shown in a classroom, and evaluated on the basis of its effect on the students. The decision may be made to try out this form of the course for a semester, with pretests and posttests to evaluate its effect on learning.

Finally, the film is produced (8 mm) with, perhaps, an imm version for student review. The audio portion of the program is usually made available for student review.

A reduction of quality in this process usually results from the lack of follow-up materials on each program.

Production Quality

For programs in the lecture format, the quality of the final product, with regard to having the required effect on the target audience, will depend largely on the sincerity of the speaker. If the speaker's ethos, character, intelligence, and good will does not come through, the student will not accept it. This necessary quality, or ethos, can be lost in a production that is too sophisticated in its artifices.

LIBRARY FUNCTIONS

Resources

The audio back-up of lectures recorded on audiotape should be made available for student review. Such is the case at Florida Atlantic University, where the students make full use of this extra means for study and review. There is no evidence of increased absenteeism from the regular classes as a result of this audio review service.

What is needed now in the way of videotapes is an inexpensive video recorder so that recorded video material can be made as accessible to the student as a book on a shelf.

Providing review materials for student use will involve the production of condensed presentations achieved by editing the original or shooting multiple versions of the same program.

LIBRARY FUNCTIONS

Legal and Copyright Restrictions

The question of copyrights and royalties will be raised by producers of materials to be distributed throughout the nation. Prentice Hall and McGraw-Hill have begun to get involved in this area, but it is questionable whether publishers of textbooks should be allowed to exercise control over the distribution of these broadly defined instructional resources.

DISTRIBUTION STRATEGIES

Systems

GENESYS

This is a graduate engineering education system established in Florida by an act of the State legislature in 1963 to meet the needs of industry for graduate training in the State. It employs the use of a television camera set up, as unobtrusively as possible, to "look over the professor's shoulder" while he is working on a problem. Since the engineering field evolves too rapidly for wide use of videotapes, the GENESYS program broadcasts "live" to various off-campus facilities for the instruction of part-time graduate engineering students.

Five hundred students are presently being serviced by this microwave system. Transmission is reciprocal or two-way, allowing student interaction with the professor. The program has been accredited by the Engineering Council for Professional Development (ECPD).

The process is expensive, costing five times as much for part-time education as it would cost, per student, on a full-time basis at a state university.

The program has successfully satisfied an established need for the education of graduate engineers in the area.

University of Florida

This University has the largest closed-circuit television system in the country. Faculty and library facilities are provided by the system to each campus of the University.

Florida Atlantic University

The use of the "candid classroom" technique on closed-circuit television provides a replication of what has actually gone on in a classroom for distribution to professor-free classes. The viewer of the program becomes a silent member of the class. Vicarious student participation is supplied insofar as the professor is televised while lecturing in a real class situation, and the response from his student audience present during the televising will consist of the usual questions from an average class. There is some sense of the dynamic student-teacher interaction retained under these conditions, more so than if the professor were lecturing in a closed production atmosphere to the camera and technical crew alone.

This technique was resorted to as the only financially possible way to serve a large student body.

Videotape

Videotape has been used for educational purposes for many years, in most cases, without great improvement or realization of its actual potential as a visual aid. It is utilized for its greatest advantage when employed for teaching basic skills and concepts which will not become outmoded in the near future.

The use of tape, which can be shipped inexpensively from place to place, avoids the expense of a cable system or broadcasting facilities. It provides the opportunity for faculty preview of the material before it is scheduled for student viewing. Tape can be edited and broken down into smaller units for student use in review, and it can be effectively produced in the format of programed material with the proper pacing of information with breaks for testing and review.

Electronic Video Recording

EVR, developed by the Columbia Broadcasting System, provides an inexpensive, easily operated film cartridge with stop-frame capability. As with videotape, EVR offers freedom of scheduling material for viewing in each classroom. Color transmission is available at low cost. The EVR film copy retains its original print quality indefinitely. Such a feature is important for archival purposes. The cartridge form lends itself well to a computer dial-access system and computerized library functions.

Television Broadcast

Satellite Systems

These do not offer sufficient potential in relation to the total job that must be done. Scheduling would be too rigid for practical purposes.

DISTRIBUTION STRATEGIES

Radio

Experiments at Wayne State University in Michigan have provided indication that audiotapes alone can be superior to audio and visual combined. In some instances, the professor's image may be interfering with learning.

Teaching Machines

Auto-tutors can be used to greatest advantage with basic skills, such as the demonstration of the proper use of a slide rule. The teaching of this kind of skill is burdensome to the professor. The teacher must be made aware of how these simple devices can free him from teaching basic, repetitious material.

Television

The greatest benefits from television instruction will come from its use in creating an environment which cannot be provided by normal classroom instruction. Television cameras can be taken into the laboratory to reproduce conditions which, due to lack of space, or safety considerations, could not be viewed by a group of students "on tour." In this situation, the television camera is more mobile than the student body. The camera can be moved into areas where advances in research are being made and can transmit this knowledge to the teaching situation.

In research, television can provide an effective communication link between professors in separated areas working on related projects. The intimacy and immediacy of live television enhances the quality of the presentation. Live television coverage of research avoids the delay of publication distribution.

Computers

Computers are of great significance to the educational system, in record keeping, administrative functions, classification and distribution of materials, and actual teaching.

At Harper College in Chicago, the faculty have ready access to computerized information on each individual student's background and academic progress.

Miami-Dade Junior College furnishes a computer terminal next to the faculty coffee room, thus providing access to information about students while overcoming the initial fear of the equipment through familiarization and frequent contact.

DISTRIBUTION STRATEGIES

Education must be given access to the massive communication complexes that are already established. Cooperation between universities in sharing computer facilities through time sharing would allow dial access into data systems across the country. Centers based at universities and providing entire states with computer services should be established. These centers would also have the space for storing significant data on educational research and development.

All existing devices for educational technology are only components of the whole system. They are not solutions to the problems of education. The technological equipment is developed beyond our capacity to utilize it. What is needed now is high-quality programing materials to be distributed on the available equipment.

There is still some use for designing hard, practical devices that will solve hard, practical problems. The future technological advances should be undertaken with a particular problem in mind.

CONDITIONS OF USE

Learning Pack Theory

Carrels for students are arranged in clusters to provide social facilitation for study, though the students are working individually.

The Miami-Dade Junior College CAI project arranges clusters of students to work in a group with a computer for solution of problems. This project employs the concepts of group dynamics, and its influence on motivation and productivity has proved to be very strong. Work in "learning packs" is preferred by students to individual work.

Off-campus work, such as the GENESYS Project, runs the risk of losing the intellectual atmosphere available in a good university. This could have an adverse effect on student motivation. Off-campus facilities are generally viewed by the faculty as unimportant to the prestige of the university.

LEARNER INTERACTION WITH PROGRAM MATERIALS

Teacher-Student Relationship

The appropriateness of direct interchange between faculty and student will never be replaced by recorded programs. This is the reason why a blend of faculty and instructional materials is needed.

LEARNER INTERACTION WITH PROGRAM MATERIALS

It is important to discover how student learning relates to what the teacher is doing.

EFFECTS ASSESSMENT

Validation

There is a great need for validating tests to be applied to the new instructional media. Judgment of quality cannot be based on how well the teacher thinks he is performing but, rather, on how well the student is learning.

There should be extensive application of pretests and posttests in educational programs which utilize the new instructional media.

ABSTRACT

THE UNIVERSITY OF GEORGIA

SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA

March 18, 1968

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March 18, 1968

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DISCUSSION IN TOPICS: Page

SOCIAL NEEDS

Population 1
Characteristics 1

GENERAL PURPOSES AND GOALS

Instructional Objectives 2
Specific Instances 3
Role of the Media 3
Operational Objectives 4
    Interdisciplinary Approach 4

REQUIREMENTS AND SPECIFICATIONS

General Purposes and Objectives 4
    Recommendations 4

LIBRARY FUNCTIONS

Materials Acquisition 5
Transmission or Distribution to Places and Points of Use 6

DISTRIBUTION STRATEGIES

Selection of Distribution Systems 6

CONDITIONS OF USE

Perception Processes 6

LEARNER INTERACTION WITH PROGRAM MATERIALS

Relevance 6

SOCIAL NEEDS

Population

Too often the needs of the irregularly enrolled student are forgotten in the concern for students residing on or near campus. However, the university has a responsibility to those students who cannot attend regular classes for varying personal reasons. The expansion and improvement of instructional television networks, enabling persons from all walks of life to receive education in their own homes, would contribute greatly to the fulfillment of this obligation.

Characteristics

The sophistication of today's students, who have been reared with the media and have been trained to accept only top quality in television, books, magazines, and newspapers of the commercial world, necessitates very high standards of technical excellence in the instructional media utilized. In this sense then "the medium is the message," and great care must be taken to reduce instructional messages to the proper format for the greatest stimulation of the students. This will require much cooperation among educators, camera men, and producers; and, of course, the initial programs will be of especial importance in gaining the students' interest. Since television lends itself well to figurative images, it should capitalize on this aspect rather than on the static format of the typical classroom lecture. Also, it was suggested that since videotape has a greater sense of immediacy than films, more use of the former should be made in the future, especially for presentation of current events and findings.

Two factors which could contribute to gaining students' acceptance of educational technology would be (1) to expose them to it at an early point in their educational career and (2) to encourage their suggestions and participation in the planning and production of films. (Develop media literacy.) In addition, lectures, whether relayed through the media or in person, should always have the atmosphere of a dialogue -- they should be more than the mere presentation of data. Thus, when a lecture has been presented through the media, time should be allowed for discussion of its contents. Recognition of the importance of viewer impact and viewer participation in technological education will do much to avoid media fatigue and technological alienation among both teachers and students.

GENERAL PURPOSES AND GOALS

Instructional Objectives

Factors which would contribute to improvement of the quality of educational television with an emphasis on the broadcast aspect revolve around the necessity for a better conceptualization of the purposes for which instructional television is used. For instance, although one of the most frequent complaints concerning the use of technological educational methods is the rapid obsolescense of knowledge, the producers of motion pictures and videotapes continue to dramatize recent findings. Perhaps it would be less wasteful if, realizing the temporary nature of most new discoveries and conclusions, the educators would concentrate instead on concepts and methods as building blocks in the educational processes.

Improvement of the technology used in education would be quite impractical without an accompanying increase in acceptance of the media by educators. Such acceptance may be gained if methods of the effective use of the media are further developed. One important step in this direction is to abolish the "all-or-none fallacy"; that is, the idea that use of the media represents a substitute for classroom interaction of every kind. Feedback on the learning process could be increased if films and other forms of the media were divided into shorter segments, allowing time for discussion between segments when the information is fresh in the students' minds. Also, in those situations in which classroom discussion is an impossibility, such as for irregularly enrolled students viewing the media at home, there would be great value in the filming of questions fed back to the instructor from a model class; this would compensate in part for the absence of direct discussion. Television is well suited for displaying electrical, mechanical, mathematical and other types of models; this trend should find favor with educators who are calling for, in increasing numbers, a greater use of models in the educational process. The chances for acceptance by instructors would also be improved if university administrations would give instructional technology systems firm support, so that they would be viewed not as a luxury but as an absolute necessity. Acceptance would also be increased if the goals of instructional technology were made explicit and immediate. This statement would aid in gaining the approval of persons in such fields as English literature and the arts. These educators are traditionally suspicious of "grand schemes."

GENERAL PURPOSES AND GOALS

Television must be used as a supplement to the teaching process -- it does not constitute an entire educational system in itself. It is a means of imparting information and should be used in a form suitable to the information being presented. For this reason much emphasis must be placed upon development of the technical excellence of the medium so that it is flexible enough to be varied to fit the requirements of individual instructors and courses.

Specific Instances

Geology. Since geology is an observational science based largely on the world, the entire field of audio-visual presentation is vitally important to the geologist and is utilized to a considerable extent. A visual representation of direct field observations made by professional geologists is vastly superior to verbal descriptions. The Geology Department at the University of Georgia has been able to assemble an adequate still slide series including film strips and transparencies. However, this has been difficult since much of the material is directed toward secondary schools and very little toward the college level.

One excellent film series, although it is most suitable for use in secondary schools, is the Earth Science series produced by Encyclopedia Britannica Films. These films have a good methodology and approach, but they attempt to make geology look like an experimental science whereas it is actually an observational science. Two films, which might be used as standards of excellence for the college level, are the Canadian Film Board's The Universe and the United States Geological Survey's The Eruption of Kilauea. Color filming is essential in geology and is well represented in the latter, although The Universe, is in black and white, it is acceptable since astronomy is a two-toned science.

Role of the Media

One of the roles of the teacher in a system of technological education is to relate the meaning of the material presented to the student. Although the teaching of techniques and factual knowledge may be accomplished through exclusive use of the media, the general cultural enrichment and the synthesis of information must be done in the classroom by the teacher. Use of educational television in this manner would free the instructor from much deadly repetition, leaving more time for direct consultation between teacher and student for interpretation and application of information, problem solving, and concept formulization.

Instructional technology could be used not only for the presentation of a body of knowledge, but as an additional and particularly effective instrument for the viewing of a real event or situation by students for their own personal experience. The interpretation of the occurrence could then be left up to the student himself since the perceptual process of every individual is unique. This type of utilization of the media would seem to be especially appropriate for the arts. Instructional television also affords the opportunity to hear lectures by men who are renown in their fields and who would be otherwise unavailable as speakers.

Operational Objectives

Interdisciplinary Approach

A primary effort should be made to assess the quality of educational television through the use of well-formulated criteria. A national effort should be made, in the same degree as has been done at Indiana University, to raise the quality to the level of commercial television; this kind of effort will require an interdisciplinary approach, bringing together a group including such professionals as content specialists, psychologists, and experimental learning theorists. Since at present there are more both instructional and commercial films copyrighted each year and since many are applicable to more than one field, there is a growing need for multidisciplinary cooperation in previewing them. This kind of faculty involvement in designing standards of quality and in the final selection of the films would contribute to a greater acceptance of technological methods of education. In addition, the individual instructor must have control over part of the system so he may structure his own course.

REQUIREMENTS AND SPECIFICATIONS

General Purposes and Objectives

Recommendations

Far too often the quality of instruction is confused with the quantity of students taught. To improve the quality, three steps are suggested. First, the instructor should confine himself to the professional role of the teacher; this will avoid the amateurism in both broadcasting and education which so often occurs when an educator attempts to play the role of a teacher, a producer, and a director, all combined into one. Most desirable would be a merger of several professionals dedicated to the purpose of developing technically and educationally excellent forms of media. This kind of cooperation may account in part for the superiority in quality, exposition, interest value, and suspense of commercial films.

Second, there must be a greater awareness among university administrators that quality costs money. In the past the media have been used unsuccessfully as a means of economy rather than as a means of quality. To used the media effectively, expenditures must be increased both for the improvement of facilities and equipment and for payment of educators who are willing to devote time and research to the development of instructional methods. In relation to this point, professional educators should be able to assume that adequate finances and technology are available when needed, so that they may concentrate on thinking through and specifying design characteristics directed toward the improvement of education itself.

Thirdly, the media should be adapted to the man, not the man to the media. Even if instructional technology is made flexible enough to meet the requirements of individual courses and instructors, the instructor must also be able to depend on the availability of services and technology. In addition, the use of educational facilities must be made as convenient as possible to promote the use of audio-visual services. For instance, in a modern university it is absurd to require classes to move to inadequate rooms for viewing television. Sets should be located where they are needed.

LIBRARY FUNCTIONS

Materials Acquisition

More time should be made available for instructors to keep up with new teaching methods and to build into their instruction blocks of visual media. There are several difficulties involved in constructing such a set of building blocks. One major problem is the unwillingness of many departments to provide teachers with the proper conditions and their own sets of materials. In addition, a method must be developed by which educators can be kept informed of advances in teaching technology; for example, although a geologist at the University of Georgia has expressed an interest in the automated method of teaching geology which has been developed at Penn State, he has no means of learning more about it. Similarly, the efficient distribution of literature stating which films are available for incorporation into programs is important for instructors at junior colleges as well as for those at large colleges and universities.

Transmission or Distribution to Places and Points of Use

In general, utilization of a remotely controlled electronic system is preferred, providing it may be interrupted when desired. This will often necessitate new buildings and facilities.

DISTRIBUTION STRATEGIES

Selection of Distribution Systems

Some persons feel that the information distribution method itself, whether it be by microwave, closed-circuit television or by a book, is insignificant. Ease of availability and the mode and time in which the information is received are important.

CONDITIONS OF USE

Perception Processes

Comparisons between the learning situation in a group and individually, involve many pros and cons. The psychological advantage of a color film projected on a large screen over a black-and-white television presentation has been stressed; this, of course, requires a group situation. A prevalent attitude is that, if a student remains at home and learns only by television, he will lose the benefits of peer group and student-teacher discussions which are primary functions of a university. To avoid this, as much dialogue must be maintained in the television situation as possible. One advantage, however, of viewing television in privacy is that freedom from the distractions of the classroom may aid in the learning of the material.

LEARNER INTERACTION WITH PROGRAM MATERIALS

Relevance

Due to the impersonality and "impatience" of the media, there is grave danger of losing the student's sense of value of the materials presented. The student must be helped and trained to relate to the technological method of instruction.

ABSTRACT

QUAIL ROOST CONFERENCE CENTER - Joint Sponsorship with the
Regional Educational Laboratory of the Carolinas and Virginia
SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
March 21 and 22, 1968

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SEMINAR ON QUALITY FACTORS IN INSTRUCTIONAL PROGRAMS USING MEDIA
March 21 and 22, 1968

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DISCUSSION TOPICS: Page

SOCIAL NEEDS

Extent and Kind 1
    Vocational Education 1
    Education of the Disadvantaged 1
Federal Legislation 1

GENERAL PURPOSES AND GOALS

Instructional Objectives 1
    Information Transfer 2
    Research in Educational Methods 2
Operational Objectives 2
Characteristics of the Media 3
    Role of the Teacher 3

DISCUSSION TOPICS: (cont'd) QUAIL ROOST Page

REQUIREMENTS AND SPECIFICATIONS

Design Strategies 4
  Examples 4
Specific Instructional Objectives 5
Acceptance of the Media 5
  Barriers 5
Specific Purpose 6
  Teacher Training Programs 6
Acceptance of Instructional Materials Across Medical Schools 6

SELECTION, TRANSFORMATION, AND PRODUCTION

Production 6
  Production Centers 6
  Production Quality 7
  Production Techniques 7

DISTRIBUTION STRATEGIES

Systems 7
  Nebraska: A State Communication System 7
New Developments 7
Print 8

CONDITIONS OF USE

General 8
Examples 8

LEARNER INTERACTION WITH MATERIALS

Student Teams 8

EFFECTS ASSESSMENT

Attitudes 9
Testing Theory 9

CYBERNETIC SYSTEMS

Information Feedback 9

SOCIAL NEEDS

Changes take place when a crisis occurs, and it becomes clear that old methods are no longer applicable. The change is often merely an accommodation to the crisis and not a radical change. A technology of education is needed, technology being a continually changing state of affairs.

The present financial crisis in education, created by the inadequate traditional methods, provides a favorable climate for change. The technology is available, but the means for relating the social needs to the processes of constructive change has not yet been found.

The new technological equipment must be applied to a real educational problem before its effectiveness in dealing with the social needs can be evaluated.

Extent and Kind

Vocational Education

The media can be particularly usefully applied in vocational training. This has been done at the Center for Research, Development, and Training in Occupational Education at North Carolina University, Raleigh, under the direction of John K. Coster. The Center has developed an interdisciplinary approach to research and training, but not limited to vocational concerns alone.

Education of the Disadvantaged

Children of substandard background constitute an important target audience for the media in attempting to raise their level of conceptualization to the required minimum base level. The media have the potential to provide equivalent concrete references to abstract terms.

Federal Legislation

The federal government's role in eventually satisfying the educational needs should be to provide pressure or incentives to get new developments in the educational processes. Funds should be made available so that a few institutions will then presumably adopt the best educational practices more readily.

GENERAL PURPOSES AND GOALS

Instructional Objectives

It is essential that specialists in education, administration, instructional media, and research participate in the formulation of the goal.

GENERAL PURPOSES AND GOALS

The clarity of the objectives will determine, in part, the type of instructional system that will be developed.

Medical education has clear objectives; this is not the case with the educational system in general.

The definition of objectives should include some consideration and description of how the results, with regard to these objectives, will ultimately be assessed.

Information Transfer

The specialist has an enriched idea of the total concept of information transfer. The concept must be organized in such a way that it can be effectively communicated to the student. Different students have different sets of concept references, one at home, one in school. For the culturally deprived the communication of concepts becomes most difficult. The language laboratory technique might be effectively employed in this area. It would provide the student with an opportunity to use the concepts. What is actually communicated is the major concern, not what is intended.

Research in Educational Methods

Theories of teaching must be developed; the rules of learning theory are not translatable directly into the teaching system.

Insights are gradually being obtained: encoding, decoding techniques of teaching have proved to be more effective than the traditional method of reading and reciting. The media have been used to a great degree on a trial and error basis; a "collective experience" is developing which should be consulted for guiding future research. The research should be directed less toward a rigid examination of "learning" in the abstract, and more toward the development of a technology of instruction.

Perhaps the real effort should not be toward more research but toward getting the results of research put into practice.

There is the possibility that techniques are already too refined to solve a problem that is not yet defined.

Operational Objectives

Change in the instructional system involves change in the institutions of education. There must be research on how to bring about change in an organization that is resistant to change. The processes of change need to be studied along with the factors necessary for effecting change. A strategy for ensuring some continual change in an educational organization is provided by Michigan State's Educational Development Project, which employs a staff of people who function as a catalytic force for constructive change based on research. The staff has the authority to provide funds and to assist interested faculty members in introducing new processes in the work of instructing students.

The media are just one component that is needed for a complete redesign of the educational system. A new relationship is needed between faculty and administrators. Disciplines within the university are not cooperating; the individual departments are not willing to sacrifice any of their traditional autonomy.

It is necessary to find a vulnerable entry point for effecting change. The prestige institutions are the most resistant to change, but if instructional technology becomes associated first with the more receptive low-prestige institutions, it may result in the opinion that technology itself is a low-prestige answer to educational problems.

Characteristics of the Media

Role of the Teacher

A radical redefinition of roles is necessary for the teacher and everyone else involved in the educational processes. The teacher no longer has the freedom to determine what takes place in the classroom.

At present, the teacher performs three incompatible roles; instructor, examiner, and disciplinarian. The role of the teacher must be made clear in reference to the organizational and institutional context. But definition of roles should not imply that roles are static; rather, a continual restructuring of roles with reorganization and retraining should take place. It is necessary to set up an organizational structure which can tolerate an advanced developing system, a framework in which all participants have the opportunity to define their roles in the organization.

A concrete starting point for a systematic redefinition of roles would be at the primary school level. At the college level there is too great a sense of professionalism and autonomy; the organizational structure at the level of the university is an amorphous one in which it would be difficult to inject this kind of activity.

GENERAL PURPOSES AND GOALS

In the academic areas of higher education, as opposed to the colleges of education, there is greater ignorance of and hostility toward the media.

The faulty assumption that the teacher is an all-round and self-sufficient person must be abandoned. Specialization of roles is required, more than just training the teacher in the use of the media. A teaching team can be patterned after the development in the medical profession, a "health team" composed of a number of technicians and specialists.

The media can play a significant role in convincing teachers and administrators of the need for these changes and in directing them in the process of change.

REQUIREMENTS AND SPECIFICATIONS

Design Strategies

Quality sells itself. If the system design has high quality, it will be readily adopted. The quality of the media with regard to effectiveness in accomplishing goals will depend upon the technical facilities, the acceptance, the utilization of the resources, and the efficiency of distribution.

Examples

At Miami-Dade Junior College, Franklin G. Bouwsma linked two campuses by microwave and used television merely as a distribution system for visual displays with audio narrative. He has attempted to get away from the lecturer or "talking-face" mode of television instruction. No data on the effectiveness of this technique are available yet.

University of Pittsburgh, Learning Research and Development Center. Robert Glaser reports that his Program for Individually Prescribed Instruction* has been validated, but funds are now needed to demonstrate the effectiveness of its procedures and materials on a wider scale. As an export, individually prescribed instruction may face resistance to adoption from other schools throughout the country.

University of North Carolina. The educational television system has three production centers. The Department of Public Instruction contracts with the University for instructional television production facilities.

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*A paper presented at the American Educational Research Association Meetings, February 17, 1966.

REQUIREMENTS AND SPECIFICATIONS

Specific Instructional Objectives

The basic objective of the instructional media is to communicate to the learner what the concepts represent, to establish an equivalent set of concepts for the learner and the teacher. In the American Samoa Project,* visuals are used to present an abstract concept, such as snow, in a more concrete form than would be possible by words on print.

Specific objectives for each individual learning task should be established to permit a more valid assessment of effects, which would, in turn, act as feedback for the ongoing development of the system.

Acceptance of the Media

Barriers

Attitudes of the teacher toward the media are barriers to acceptance. The teacher should be indoctrinated in an actual use situation with the media and participate in planning for their use.

Teacher training could result in more effective utilization of the media. Regional setups for training teachers and administrators in effective use of the media need to be established, with support for the creation of in-service teacher education programs at the individual institutions.

Educational television can be used for teacher training in both subject matter and utilization of instructional material. This practice may become a regular part of the work of each teaching day.

Incentives for teachers to get the necessary reevaluation of teaching roles must be provided by the administration. The professor achieves status mainly through research, not by teaching. There are not sufficiently and clearly differentiated skills for teachers to provide the necessary status system. The restraining chains of tradition must be broken to get the teacher involved in goal setting, management, and organization of instruction. Federal funding should shift from research to instructional projects.

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*UNESCO: International Institute for Educational Planning. New Educational Media in Action: Case Studies for Educational Planning - I. Sponsored by U. S. Agency for International Development, 1967. 203 p.

REQUIREMENTS AND SPECIFICATIONS

Students can be viewed as barriers to utilization of the media; already without media they feel they don't have enough contact with the teacher. This may not be a response to the media as much as a response to the kind and quality of instruction coming over the media. Student reaction to the media would depend to a great extent on the quality of the media, since the students are the consumers.

Principals may favor use of the new media because they are the means to free the staff for other work.

Mediocre teachers are usually the ones who want to use the media because it demands only that they be monitors.

Specific Purpose

Teacher Training Programs

The Radio Corporation of America has developed instructional television "orientation courses" for training teachers in the use of the instructional hardware. Primary and secondary schools take advantage of these courses; junior colleges and institutions of higher learning scorn the idea.

Acceptance of Instructional Materials Across Medical Schools

Medical schools use very few films that they do not produce themselves. This is partly the result of a subjective bias, partly because the same kinds of practices do not apply in different regions, and partly because the producers' professional idiosyncrasies have influenced the format to the detriment of wider usage. Different standards in different medical schools also make the exchange of training films unacceptable.

SELECTION, TRANSFORMATION,AND PRODUCTION

Production

Production Centers

A central production facility would only function efficiently if institutions would be willing to share materials and possibly have whole courses distributed.

Production at local centers would be a more reasonable procedure for producing materials not for use beyond the area where they are produced. A cluster of universities could possibly work together in producing programs acceptable to each of the cooperating institutions. Perhaps the need is for major regional production centers for instructional material, financially supported and staffed by government, education, and industry. Most production facilities already in existence suffer from parochialism and lack of resources.

The uses of the materials being produced could be better ensured if the centers for production would act in response to a critical educational need and to specific institutional needs for specific uses defined by specifications provided by the institutions.

Production Quality

Impossible demands have been made in the form of deadlines; quality is ultimately reduced.

The technological equipment is getting far ahead of the amount of good instructional materials to use with it. Program production must be increased and improved.

Production Techniques

Educational television is mainly just putting instructors on tape; there has been very little use of the media variations when the full potentials are considered.

Programs should be condensed for review, either by editing, or by producing a shorter version of the original presentation.

Program materials should direct audiences to other sources for information, thus promoting wider utilization of existing media.

DISTRIBUTION STRATEGIES

Systems

The separation of production and distribution should be maintained. Production facilities should be located in several content areas in universities but coordinated to limit the amount of duplication. The materials would then go to a central switching center for distribution.

Nebraska: A State Communication System

The state of Nebraska owns a state system of police, medical and educational communications, with combined AM, FM, and television.

New Developments

Electronic Videorecording (EVR) developed by the Columbia Broadcasting System makes possible a flexible instructional schedule. EVR is much less expensive than videotape. A $225 EVR receiver can feed 12 adapted television receivers by wire with a cartridge-stored program (color or black and white).

DISTRIBUTION STRATEGIES

The material is greatly condensed, and conversion of existing stock to EVR form is inexpensive, $12 for a half hour. The receiver will have stop-frame capability, and random access to any part of the program will be made available in the future. It will be possible to have computer print out at the receiver end for data transmitted by television signal, and copies of visuals, data, and print will be rapidly printed out for class distribution.

This process will enable complete freedom for each classroom to schedule its own viewing.

Print

The questions must be asked, Is there any instructional value in having a professor deliver a lecture with no student participation which would warrant the use of televised lectures instead of using, as a distribution form, the same lecture material printed in mimeograph form? It is a different type of input, but is it better? Videotape has been used merely to replicate what is presented in a lecture-class situation. In terms of economics, the benefits of print are obvious.

CONDITIONS OF USE

General

The production and utilization of the media facilities should be moved into the center of the planning and development work of universities.

Examples

Florida Atlantic University. The educational technology is built centrally into the university. Material is available for student review. The professor is filmed while lecturing to the students. Dormitories are planned as study centers. (See Seminar held at Florida Atlantic University.)

LEARNER INTERACTION WITH MATERIALS

Student Teams

The language laboratory design should be implemented for teaching students the correct terminology for the classroom. Students often don't have the chance to speak in many courses; they receive the input but there is no response. The language response is not adequately practiced.

Organizing students in teams allows for learning by interaction and immediate evaluation through feedback from within the group. Franklin G. Bouwsma has demonstrated at Miami-Dade Junior College the strong social

LEARNER INTERACTION WITH MATERIALS

component that develops from clusters of students studying and working together. Here is a compensation for individual study.

Student interaction is needed. How the student responds determines what will be introduced into the revision of the material; in this way, the student provides a source of feedback to the system and contributes to the evaluation processes.

Rules from learning theory are not easily converted into teaching techniques.

EFFECTS ASSESSMENT

Attitudes

There is generally a negative reaction by the students to self-contained television in school. The most common complaint of the students is that they are too regimented.

Testing Theory

A knowledge of the relationships between methods introduced and their consequences is needed. The chain of means-end relationships must be carefully analyzed.

There is no one dependent variable upon which to evaluate results. Single variables are not alone involved in the educational processes. Identification of all effective variables is required before it is possible to sort them out as to cause or effect.

CYBERNETIC SYSTEMS

Information Feedback

The teacher needs continuous assessment of how well his performance matches his intentions. Communications between teachers for establishing successful techniques should be kept open.

In the project in American Samoa* radio provided contact so that the teachers could consult with each other in assessing the progress they were making.

The best instructional design system would be the one which provided maximum feedback.

*UNESCO: International Institute for Educational Planning. New Educational Media in Action: Case Studies for Educational Planning - I. Sponsored by U. S. Agency for International Development, 1967. 203 p.